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LIMITATIONS OF DENTAL PROPHYLAXIS.

BY M. L. RHEIN, D.D.S., NEW YORK. READ BEFORE THE SOUTHERN
BRANCH OF THE NATIONAL DENTAL ASSOCIATION, AT WASH-
INGTON, FEBRUARY 23-26, 1904.

The value of keeping the oral cavity in as nearly a hygienic condition as possible is no new doctrine, and its benefits have been described by the earliest writers on dental topics. The essence of dental prophylaxis can be summed up in one word—cleanliness. Establish and maintain this condition, and diseases of the teeth and their contiguous parts become, as far as we know, an absolute impossibility. This sounds like an easy proposition, but only the careful observer realizes the small percentage of mouths in which anything approaching such a condition can be maintained. This, however, is no excuse for the dental practitioner's failure to teach and impress its value on every patient who seeks his services.

During the past quarter of a century preventive dentistry has been taught in a larger degree than ever before. The steady and increasing propaganda of different teachers, mostly in the United States, is finally showing its effect, and there is at the present time a gleam of hope that the practice of the principles of dental prophylaxis will soon find a permanent and systematic status in every reputable practice. At present there is some discussion as to how this question should be met. The principles, however, remain the same—preserve as far as possible a clean condition of the oral cavity, and in doing so bring about a normal condition of the capillary network which otherwise cannot properly perform its function as a carrier of nutrient activity to the dental territory.

In a number of papers presented on this topic I have endeavored to show how futile it is for a busy practitioner to personally attend

to the duty of tooth polishing and counteracting the inroads of bacterial agencies. The trained medical nurse prepares the patient for the surgeon by placing the parts to be operated on in a sterile condition. In like manner the trained dental nurse should clean, polish and sterilize the dental organs before the dentist commences any work. The gratifying reports received from all sections of the country during the past few months indicate that the plan of training women as dental nurses for the carrying out of this object is meeting with great favor by the busy practitioner.

The present drawback to its adoption is the lack of educational institutions for this purpose. On that account the dentist up to now has been compelled to train and teach his own nurses. There is no question but that those who have followed this plan have found it to be not only beneficial to their patients, but profitable to themselves.

There is no gainsaying the fact that young practitioners, by virtue not only of the time at their disposal, but in furtherance of their manual dexterity, can with benefit to themselves dispense with the services of a nurse and personally do this work during the early part of their career.

No one can fail to be astonished if he will try to estimate the number of well-accredited dentists who will commence filling the teeth of a new patient and never think of first cleaning and polishing them. This initial cleansing and polishing looms up as the primary point of importance, and it might serve a useful purpose if representative societies would in a formal manner declare their position in this matter. I say without hesitation that, except for the alleviation of pain or some temporary work of emergency, it ought to be considered absolute malpractice to proceed with dental operations unless this initial cleansing and polishing has first been efficiently performed.

This brings up another point—the varying methods pursued by different men who claim to cleanse the teeth of their patients. We all know the man who will spend a half hour polishing up the surfaces of the teeth which show. From this class we can proceed by stages to the men who remove all the accretions and polish the surfaces of all the teeth above the gingivæ. We realize well the limited number who give the necessary time to removing every particle of foreign matter not only from the teeth but from the

roots, and who never find their operation completed until every exposed surface of tooth structure has been thoroughly polished. This deception towards patients, in pretending to clean their teeth, is often more reprehensible than the practice of those who make no pretense whatever at doing any work of this character.

It is not intended in this short paper to go into the detail of the technique of this work, but it is important that attention should be drawn to the fact that the patient should be informed after the operation has been completed that it will be necessary for him to present himself for such treatment at stated periods. These periods cannot be left to the whim of the patient, nor can they by any means be the same in all cases. It is safe to say that they will vary in different patients from a period of two weeks to three months.

Before dismissing the patient after the primary operation it becomes the duty of the dentist or the nurse to take sufficient time to carefully instruct him in the daily hygienic care of his mouth. This is by no means an easy matter, and frequently fifteen to thirty minutes can be profitably spent if it is intended that he shall fully understand the principles that are taught. It is an absolute impossibility to expect that the mouth will be maintained in a normal state unless the earnest cooperation of the patient is obtained in this regard.

Primarily patients should be instructed as to the character of the brush and dentifrice which is prescribed for them, and then they should be taught to appreciate the importance of using the same, by placing the flattened side of the bristles on the gums as near the ends of the roots as possible and rotating the brush towards the occlusal portions of the teeth. It should be made patent to them that this must be done as a deliberate motion, so that the gums will not fail to receive the beneficial effect of the massage action of the brush. They should be taught the importance of doing this thoroughly after every meal and especially before retiring, and that it is almost impossible to accomplish the desired result in less than four minutes. It is remarkable how difficult it is for some people to learn the proper method of brushing the gums and teeth, and they can frequently be materially aided by instructing them to do the work in front of a mirror, so they may see for themselves that it is properly performed.

The selection of a dentifrice is a matter of greater importance

than has been commonly given thereto. It is the duty of the dentist to know what materials are used by his patients in the cleansing of the teeth. We have no more right to leave this to the fancy of the patient, or to recommend something that we are unacquainted with, than we would have to prescribe internal treatment in the same manner. It is unnecessary for me to say that various forms of dentifrices can be used to advantage in different cases.

Of course it is wise to let the patient understand that after the primary operation of cleansing and polishing has once been properly done the succeeding operations will become very simple in comparison. It is also best when he returns for succeeding treatment to have the nurse catechise him as to the manner in which the directions previously given have been carried out. Too frequently it will be discovered that they have been entirely misunderstood, and a fresh course of instruction is then necessary.

With all the care that the dentist or his nurse can give, aided by the heartiest cooperation on the part of the patient, there are certain conditions of life when it becomes impossible to keep the oral cavity in a physiological state. The extreme views that have been held on this subject—that it is possible to so care for the teeth in a prophylactic manner that other forms of dental work will be absolutely unnecessary—have brought no slight amount of discredit on the entire doctrine of preventive dentistry, and I might say that they have even served as an excuse for many to retain their unscientific methods of caring for the teeth. That the general principle holds true of the teeth of people in a state of health is not denied, but it would not be difficult to count the number of our patients who go through life always in a state of such health that all the organs are performing their functions in a truly physiological manner. In the degree that we meet with variations from the normal type in the same degree will we find limitations to the benefits to be derived from the most energetic form of dental prophylaxis that can be practised.

It is well that these limitations should be clearly defined and understood, so that the practitioner will deceive neither himself nor his patient. In acute diseases of all forms affecting children or adults, where the patient is confined to bed for a period of time, it is impossible to obtain the benefits of manipulative prophylactic work. In many acute diseases anything approaching manipulative

work would be only irritative in its results, and consequently prove harmful instead of beneficial. In some of the diseases of later life a certain amount of manipulative work is frequently beneficial, while if injudiciously carried to the stage called for in ordinary cases it will produce destructive results.

There are certain periods of life where, on account of functional disturbances of one kind or another, we find the oral secretions in an abnormal state. This may be of a temporary character or cover a longer period of time. All the combined prophylactic work of the dentist and patient will not avail against serious perversions of the excretory glands which combine to form the oral secretions. It is not denied that manipulative prophylaxis is of value in these cases, but it is a physical impossibility to do the work frequently enough to prevent the painful injuries resulting on one hand in erosion of enamel and its attending evils in hyperacidity, and on the other hand resulting in caries more or less rapid and necrotic gingivitis from hypoauidity.

These strongly alkaline conditions of the oral secretions are the most difficult to combat and the most destructive in their results. These are the media in which the racemoza bacteria thrive best, and in which as a result caries is most destructive. Perhaps this can be more readily understood by picturing the well-known cases of growing children, where all the hygienic care that is possible is impotent against the destructive action of caries. This is caused by the inability of this class of children to properly meet the increased demand for nutrient matter. Their growth and development seem to proceed at the expense of the entire body. One of the results is seen in this perversion of the oral secretions, due to chemical changes. This alkaline fluid presents the media in which nothing seems to avail against the rapid progress of caries. When the child reaches a certain age, and the developmental period seems to be attained, in a flash the secretions of the mouth change, and we realize that the child has reached the period of immunity from caries.

In this manner we could proceed almost ad infinitum and show how futile is our effort when directed against certain pathogenic conditions. These conclusions, however, should not deter us in the great and humane work of spreading over the entire world the benefits to be derived from preventive dentistry, but in so doing let us retain our proper professional and judicial status. Let us

look at it from a scientific standpoint and be conservative in our expectations. Is it professional to hold out promises of perpetual immunity to our patients? We must realize that with the best of intentions on our part the conditions pertaining to a healthy mouth can be maintained only to a limited degree at certain periods.

A FEW GENTLE HINTS.

BY L. C. TAYLOR, D.D.S., HARTFORD, CONN. READ BEFORE THE SOUTHERN BRANCH OF THE NATIONAL DENTAL ASSOCIATION, AT WASHINGTON, FEBRUARY 23-26, 1904.

In the winter of 1876 Dr. John M. Riggs came to this grand and beautiful city. While here he visited the Museum of Ancient History, and among other things examined the skulls of 164 prehistoric Indians. These wonderful creatures, who existed many centuries ago, had physiques and personal endurance that we might be proud to inherit. While the intellectual faculties were not over-developed, we believe it is interesting to note what was found. Of the 164 skulls examined there were but two with teeth decayed, and only two that showed signs of inflammation of the gums sufficient to produce absorption of the alveolar border. All indications pointed to health, longevity of life, and the teeth of a large number of them showed signs of vigorous use, as they were considerably worn.

Now let us contrast this with what we find in the mouths of our common and so-called well-to-do people. What per cent of them can produce a respectable, cleanly, wholesome mouth? Let my friends answer. To me it is a serious thing to see young people, sixteen to thirty years of age, under the doctor's care for what they call dyspepsia, and in some extreme instances they are reported to be on the verge of general decline or nervous prostration. Can you tell me why so many men will read papers and discuss at such length the importance of boiling their instruments fifteen or twenty minutes for sterilization, and then observe the septic condition of their patients' mouths only so far as to fill a cavity when easy of access? There seems to be a general desire on the part of all dentists to be known as Doctors of Dental Surgery. When that degree has been obtained they immediately turn their

attention to filling teeth, making bridges, and such mechanical operations as can be seen in the mouth, with perhaps an occasional treatment of a septic tooth.

Why are so many men willing to treat a septic tooth? Because there is going to be a premium paid, and that premium is a chance to make a filling. Are these fillings good savers of teeth? Will you state what per cent of gold fillings is valuable? Of all teeth filled with gold, when no other preservative of tooth structure is used, there is not ten per cent well preserved for five years. Of course this statement is not based on any one man's experience, for many men have so much pride in their work that the percentage is very much higher. Our Western friends are becoming so zealous in saving teeth with gold that they cut away a very large portion of enamel and cover the dentin with gold. This they call extension for prevention. I believe that if those friends would conserve the good looks of those teeth by proper and conservative preparation of their cavities, and then pay a little more attention to hygiene and prophylaxis, their service would be much more appreciated by their patients. Where is the person, well educated and refined in his general nature, who wants to see gold built out on his teeth, either in fillings, caps or bridges? When this unsightly display of gold has been made, will you say how many men are recalling their patients, monthly, bi-monthly or even tri-monthly, to thoroughly clean and polish that jewelry and the teeth that are carrying the same? How many are recalling their patients to remove all foreign substances from the mouth, thereby preventing the common diseases which follow? How can we expect the dental profession to attain the high rank of hygienists when our professors in colleges will swish a little iodine across the six front teeth? A half minute with engine and brush, when the patient is dismissed, carrying all the germs of disease so prevalent in the mouth, to lay that patient on the altar of general prostration.

It has been a great source of satisfaction to me to see the general interest that is being taken by our Southern brethren in the advancement of the cause of prophylaxis. It would be a still greater satisfaction could I see the same interest following the sun in its westward course. It was my privilege to be associated with Dr. Riggs and listen to his teachings thirty years ago, when the unwholesome condition of the mouth was called "scurvy of the gums."

There was then, as now, a great deal of opposition to advancing along any line of usefulness except it be of a mechanical nature.

Since Dr. D. D. Smith commenced his teachings of prophylaxis, showing such results as have never been before attained, my enthusiasm has gotten much the better of me, and for five years I have had the honor of presenting a prize to the students of the New York Dental School for the best practical results in oral prophylaxis. Barnes Dental College of St. Louis has honored this department by having a special professorship, thereby making it a recognized department of the dental profession. Some of the Southern colleges have introduced some lectures along this line, but I have not learned of a dental board that has taken any interest in the matter.

Bacteriologists have shown us pictures of their pets for many years, until we know the bacteria almost as well as we do the multiplication table. They discuss at great length the difference between alkaline and acid secretions, determined by the best of chemical tests; they photograph and give us the name of each and every one of these little germs; but what does it matter whether we call them Japs or Russians if we fail to call them out of the mouth? Where is the man among the bacteriologists who has given us any well-defined, businesslike system of how to rid our patients of this nefarious evil? This photographing bacteria and showing same on the screen is all right to teach in colleges to the freshmen and sophomore classes, but when we come to the juniors and seniors it is time to take a step forward into prophylaxis and show these young men and women how to rid their patients of the evil consequences of such bacteria.

There is another phase confronting us to-day. Many believe the profession is overcrowded. With such as it is I think it may be true, but when our dental boards have attained to a standard equal to what may be attained in oral hygiene and prophylaxis, and decline to pass a man who is not fairly well versed in such training, we will have such a revolution in the demand for work that there will not be half enough men to supply that demand. There is more valuable service left untouched than is done, and so much of that rendered is worthless to the patient that it is a wonder to me people have as much confidence in us as they do.

Not long since a prominent man asked me if I believed dentistry

was maintaining as high rank to-day as twenty-five years ago, and I was so surprised that I did not attempt to answer his question. He further remarked that while there were good men in the profession it seemed to him the average man was not up to the standard of twenty-five years ago. Why are people judging us in this light? Is it because we deserve it? Has not all our advanced education, reinforced by the dignity of examining boards in every state, counted to our credit?

The public demand as far as they are educated, but the education for years past seems to have been running mad along the downward course of mechanics—cutting away two good teeth for the purpose of bridging one—and it seems a fitting time to sound the alarm in tones loud and long, for if this mad course continues the last state of our patients will be even worse than when Josiah Bacon made such exorbitant demands for royalty in permitting us to make a rubber plate. The extraction of bad and good teeth to make room for a plate made a cleanly mouth possible, but the insertion of many bridges produces a condition which makes it impossible for the patient to keep the mouth wholesome. It is time for the dentist to rid his mind of the idea that it is a disgrace to remove foreign substances from the teeth. We must educate our eye to the healthy and cleanly and be prepared to render such service as may be necessary to procure these results. Do not complain of your patients not caring for their teeth. It has been my experience, as I recall my patients and show an interest in their health by giving them a cleanly mouth, to before long hear them ask: "Doctor, what can I do to help keep them clean between times?"

Pyorrhea, sometimes known as "Riggs' Disease," is very prevalent in civilized life. It is a pitiable sight to see so many of our eminent men wandering in the wilds of Africa, trying to convince us that uremia is the cause of this loathsome disease. Can you show me an individual among them who has brought back one single idea that is self-proven or given a practical demonstration of cure outside of his imagination? The contrary is proven in every instance by the fact that when the disease has extended so far that it is impossible to save the teeth for usefulness only extraction will effect a cure. This trouble is overlooked by many who do not seem to know of its existence until the teeth become so loosened and the bone wasted to such an extent that in many

cases even the expert is not able to save them. This is all wrong. The first symptoms of inflammation in the gums should be recognized, and the cause removed before the slightest particle of pus is present. If we recall our patients monthly, bi-monthly or tri-monthly, and educate our own eye to the healthy and cleanly, we will never have pyorrhea and the consequent loosening of the teeth. Recession of the gums, with a thickened, whipcord edge, may be reduced by proper removal of any irritant. Some call it a vitreous coating, but whatever it is, remove it.

I have referred to the engine and brush wheel, and they have their place in dental service, but that place is not in the performance of such prophylaxis as we desire. When you polish the face of the tooth with the brush wheel it will do its work so well on the face of the tooth above the gum that when we attempt to do the rest we find we have lost our guide and are deceived in doing that which is of the greater importance. I have never seen nor known of good results along this line except by the greatest care and all hand work. If the patient is sensitive to being hurt, sprinkle a little cocain salts over the gum and allow the saliva to dissolve the crystals, when you can do some vigorous service without serious complaint. The cocain should be used about the same as when applying it to adjust the rubber dam, but in no case allow the patient to swallow it. It can be used liberally in this way without danger if not swallowed. I have been cautioned by young men of the danger in using this drug, but many years' experience without the slightest symptoms of trouble has proven that it can be used judiciously in almost any case, and especially when treating gum irritations. When the mouth has been brought under perfect control there will be little if any need for the use of cocain.

All methods are proven by the results obtained, and I contend that prophylaxis is proven beyond a doubt or question. Let us not complain of the profession as being overcrowded, for in this case the fault is with ourselves. The public are anxious and willing to be taught better methods, and with us lies the responsibility of teaching them. Prophylaxis is the only true and practical method which has solved the problem of painless dentistry.

DISCUSSION ON PAPERS OF DRS. RHEIN AND TAYLOR.

DISCUSSION. *Dr. L. C. Taylor:* I wish to make one further remark while speaking of prophylaxis and oral hygiene, as there seems to be a great difference of opinion as to what they mean. Hygiene is defined as that branch of medical science which pertains to the preservation of health. We are supposed to have health first, and then to maintain it. Prophylaxis is not defined by all dictionary authorities, as it is a rather new word and is probably used more in dentistry than in any other profession. Most dictionaries define it as "a preventive treatment." It seems to me that it is used and comprehended at the present time by those who are taking the greatest interest in it, especially by Dr. Smith, who has brought it so much into the foreground, as meaning surgical or manipulative treatment for the preservation of health, and I believe that is a better definition. There are many people who consider prophylaxis to mean simply cleaning of the teeth, which is correct, but that is only a limited field and is as nothing compared to what is meant by those who teach it most.

Dr. M. L. Rhein: In my opinion it is an absolute waste of time to stop to differentiate between these two terms, as they mean precisely the same thing. Without seeking any laurels, so far as I am aware I introduced the word prophylaxis to the English-speaking world. This was in 1882, when I was in search of a word that would protect the manufacturers of the tooth brush known by that name.

Dr. J. N. Crouse, Chicago: I never saw mouths in such good condition as those Dr. Smith showed me in his office, but I have not been able to induce my patients to keep their mouths in such excellent shape. However, I attribute Dr. Smith's success to something more than his monthly treatment. He is vigorous and sarcastic in speech, and I believe his success lies not so much in getting his patients to come to his office every thirty days as that he impresses them with the importance of their so doing, and they would hardly dare come to him a second time unless they had been carefully and thoroughly brushing their teeth. Be this as it may, it is surely a good thing to see one's patients often, as it must increase diligence on their part.

A Member: Do you believe that if we talked to our patients as he does to his they would come back to us?

Dr. Crouse: No, I believe it would have a tendency to drive them away. I don't think the average woman can do this work properly, because it requires a great deal of skill and thoroughness, and I don't believe enough girls can ever be trained to do it. Dr. Rhein's suggestion about dentifrices is timely, and the dentist must not only designate what one his patients shall use, but must examine and test the best ones before making his decision.

Dr. B. Holly Smith, Baltimore: Since I visited Dr. Smith's office and examined some forty mouths which had been treated by him I have felt a new responsibility to my patients, and I have worked as never before. I had not been careless previously, but the success which I have attained along this line has been a revelation to me. When any dentist will absolutely clean and remove every particle of calcareous matter from the tooth, polishing it as it should be polished, he will leave it as nature intended it should be. No diamond ever shone more beautifully than a new tooth, and no surface was ever more pleasingly polished. Look in the mouth of a dog, and then think what it would mean if we could make the teeth of our patients stand forth in their proper gingival relation with the delightfully healthy expression we see in the mouths of animals.

Dr. N. N. Vann, Gadsden, Ala.: When I was in college I was impressed with the fact that the majority of students did not want to clean teeth, and when the juniors and seniors worked for a patient they would always turn the cleaning over to the freshmen. I believe this was due to the fact that they did not appreciate the real value of the thorough performance of this operation. I did not then nor for a number of years afterward, and I believe the majority of us left school in this state of ignorance. Even now it is impossible for me to clean teeth as I should like to, for I find it extremely difficult to remove every particle of salivary calculus. We would have less inflammation and so-called pyorrhea if we paid proper attention to cleanliness. I have often wished for something that would impress my patients with the importance of keeping their teeth clean, and have endeavored to secure a chart showing the injury salivary calculus does, so that it could be hung on the wall and impress the patients as do those charts showing dentition and other subjects. Dentists, in the country at least, are largely to blame for the negligence of their patients in this matter. It is the custom in many country districts to "run over" the teeth with a brush after

having done other work, and not charge anything for the cleaning. I believe we should do as Dr. Rhein suggested—clean the teeth first and then impress the patient with the necessity of keeping them clean, and we should charge for the cleaning just as we would for putting on a crown, for no part of our work is more important than this.

Dr. Robin Adair, Atlanta, Ga.: I had hoped that it would be accepted as merely an academic proposition that prophylaxis was essential for the preservation of the teeth, but there seems to be a difference of opinion among our eminent men as to whether even dentifrices should be used. One offers the experiment of putting a tooth in a vise and wearing away the enamel in a few hours with chalk and brush, while still another says that the tooth brush should not be used, but simple massage of the gums. If these men, learned in their profession, will not put forward every effort to advance prophylaxis, what can we expect from people who understand little if anything about it? I examined a dentist's mouth a few hours ago, and he apologized for its condition and said his tooth brush was at home. It is probably a fact that many of the dentists here have not brushed their teeth to-day. How can we expect to inculcate the proper principles and habits into the minds of our patients if we do not appreciate and practice them ourselves? It is a fact that dentists will not spend the time necessary to obtain prophylaxis of the mouth because it takes an hour or two to cleanse every surface of the teeth, and they can afford to spend only a few minutes with a little rubber wheel and then dismiss the case as clean. We should call this cleaning by some big name and so make the patients appreciate its importance. I often take their hands in mine and go through the motions in their mouths so as to teach them. The dentist should not merely talk, but should make the patients demonstrate while in the chair how well they can brush their teeth. Sometimes I illustrate with a brush on a set of false teeth. When a proper brush is used, and the patient knows how to handle it, the teeth will not be injured by any good dentifrice. In cases where we have operated for Riggs' disease and there is exposed dentin which is rough and which readily collects deposits, it is imperative that a liberal supply of dentifrice be used to keep those surfaces polished.

Dr. Beaty, Washington, D. C.: One point predominates throughout Dr. Rhein's paper—cleanliness, which is highly essential—but

many of us cannot give the time and attention required for absolute cleanliness of the teeth, so it would be well if we could teach this work to a young woman in our offices and then charge our patients a small sum for the services which she renders.

Dr. B. H. Teague, Aiken, S. C.: I think dentists in the South are very lax in prophylactic work, owing to the fact that they do not get paid for same. They are surrounded by so many cheap Johns that they do not have the grit to charge a sufficient fee for that kind of work in the first years of their practice. I recently did some work for a wealthy but stingy man who lives twenty miles away. His gums were bleeding from calcareous deposits, and I charged him five dollars an hour for two hours' work of cleansing. He paid the bill willingly, and when the report of my collecting from him such a fee for cleaning the teeth spread abroad the dentists in his town were able to charge a little more for this kind of work than they formerly did. I have a woman who assists me in the office, and I charge so much an hour for this class of work.

Dr. Taylor: With regard to what Dr. Rhein said about prophylaxis being a waste of time, I would say that he seems to beg the question considerably. The five leading dictionaries speak of prophylactic and confine it solely to medicine and therapeutics, but the word prophylaxis is a noun every time. Dr. Rhein uses both words as meaning to cleanse the teeth, but what does he mean by that? He does not in any part of his paper allude to any condition where there is a serious affection about the teeth irritating the gum tissue. He cannot cleanse them then; he must remove the matter from the teeth before the gum will come down healthy and firm. If the trouble has gone so far that the alveolar border is honey-combed and necrosed, how is he going to clean it by scraping the teeth? So far as I know nothing short of a surgical operation has ever cured that kind of a case. They talk about curing it systemically, treating the patient systemically for uremic trouble. In many instances of uremic disorders mouth infection is the cause. It is an impossibility to cure a bad case of pyorrhea by systemic treatment; it must be done strictly from the surgical or manipulative point of view. A surgeon would not be justified in trying to cure a broken leg with a little medicine, therapeutic or prophylactic. Cleansing is a very soft word and does not mean much of anything in this connection, but prophylaxis means something more than

cleansing. It means the deeper surgical effects that produce health.

Dr. Rhein speaks of his dental nurse being educated up to a point of competency, but when she reaches that point she will be able to diagnose the causes of the malady, to teach the patient what the disease means and what the treatment should be, and why it is important that the patient should come from time to time to have his mouth kept in perfect order. When the dental nurse reaches that point she will become the doctor and the dentist will be merely the dental jeweler or the dental carpenter.

Dr. Rhein: The one vital point which I brought up seems to have been overlooked in the discussion, namely, that it should be considered malpractice to proceed with an ordinary dental operation in an unclean mouth. There is little difference of belief between Dr. Taylor and myself, and what little exists is due to the fact that Dr. Taylor does not understand me. We have no differences of opinion as regards the surgical treatment of these diseases. I never spoke of having a dental nurse attend to these matters, but Dr. Taylor knows as well as I do that when he has looked after the surgical conditions of the mouth it should then be attended solely by the nurse—if there is one. I deplore the fact that there are no opportunities at the present time to properly train dental nurses, for I could give a great many of them positions with various leading men who have written me. With no desire to advertise myself or to enhance the value of the work to my patients, I would say that my office is open at all hours to any practitioner, and if he can learn anything there he is perfectly welcome to do so. I believe I can show just as healthy mouths from the hands of my dental nurse as these gentlemen have seen from the hands of Dr. Smith.

I approve the policy of telling the patient, "Unless you follow my directions you are no longer a patient of mine," and I have said it many times, but unfortunately those patients come back and it is hard to tell a patient who insists on your services that you will not work for him—you must make allowances for his weakness. I will admit that all of my patients do not present with their mouths in such a condition as I should like, but I cannot keep some of them from coming back because I have told them not to return unless they have followed my instructions. That is the difference between Dr. Smith and myself—he has personally done this work for his patients, whereas I have not done any of the hard polishing and

cleansing, which, when you come right down to facts, covers it all. It means simply the careful cleansing of every exposed portion of the tooth and the polishing of the surface so that it will be as clean as the pure enamel. I do not say that an ignorant woman should be put at this work, and I have spent a long time before I could get women to do it properly. I have taken women who have graduated from dental colleges, even from those schools where Dr. Taylor had offered a prize, and found that they knew nothing whatever about this work. I have also tried men graduates of dental schools, and I find that the women are much better fitted by nature to do this work. One member spoke of working four and a half hours on a case, but we have spent twenty to thirty hours on a single mouth. Indomitable patience is required, but no time is too long or pains too great if the result is accomplished, for once having attained it the patient will do the rest if you are persistent enough.

I do not wish to say anything in depreciation of this work as taught by Dr. Smith, and I strongly advocate that every practitioner should do it in that way, but if there comes a period when a man finds it impossible to do justice to all his patients for lack of time he has no right to neglect a number of them, especially not to sacrifice the poor clients for the rich ones. If a practice is limited to fifty or sixty patients a man can do all the work himself, but I am speaking for those who work for a larger number. I do all the surgical work that is needed in the mouth, but I won't do, even for my wealthiest patients, any polishing or cleansing so long as I have a woman in my office who has been trained to do this work. As regards Dr. Taylor's fear that the nurse will supersede the dentist, the nurse does not do this work on her own account. My nurse does not see my patients independently. I meet the patients when they arrive, tell the nurse what to do, and examine their mouths before they leave her chair. I think my patients get better work in this way than they would if I tried to do everything myself.

The question of fees is important, as the work is deserving of the highest fee that can be obtained for it, but there is no necessity of going to extremes, for by putting the fee too high you limit the service to the wealthy few. The charge should be based on the amount of time consumed. I place the fee of my dental nurse lower than my own, not that I think the services she performs are less valuable, but because I do not want any of my patients to have the conventional excuse in regard to it.

The point I am now trying to emphasize is that there may be an opportunity to train women for this work. They should of course understand physiology and anatomy, but they need not be dental college graduates nor understand all branches of dentistry. There is a field for all this education, but the field of prophylaxis so eloquently described by Dr. Taylor will never be reached by the public so long as the dentist is bound to do all the work himself. I object to my friends being made the tools of any one man's ambition to further his interests in the minds of his patients. I am seeking for the good of the public, not only of the wealthy, but of the residents of every little humble village. By my plan every dentist of average ability could in the course of a year teach a competent young woman to clean and polish teeth with the orange-wood stick, pumice stone and strips, and she would not only earn a better livelihood than by almost anything else she could take up, but she would be doing a great work for the preservation of the teeth of the nation.

COMMON MISTAKES MADE IN ARTICULATING FULL DENTURES.

BY E. M. KETTIG, D.D.S., LOUISVILLE, KY. READ BEFORE THE SOUTHERN BRANCH OF THE NATIONAL DENTAL ASSOCIATION, AT WASHINGTON, FEBRUARY 23-26, 1904, AND BEFORE THE KENTUCKY STATE DENTAL ASSOCIATION, AT LOUISVILLE, MAY 17-19, 1904.

As I am down for a paper in prosthetic dentistry, I will endeavor to respond and take for my theme common mistakes made in articulating full dentures, or probably a little more fittingly expressed, mistakes or errors commonly made in articulation. It is not my purpose to offer anything that is new in articulation, and those older men in the profession who are ripe in experience and practice will receive but little enlightenment on this subject, as the most of them probably know far better how to steer clear of troubles and mistakes of all classes of work than myself. To the young man, however, who has not yet lived up to a full appreciation of what it means to correct costly errors in his prosthetic work, and who has not yet come in contact with the multitude of mistakes that are liable to happen, it is my intention to speak. If I can point out

a few ways of avoiding common errors the purpose of this paper will have been gained. It may be a trite theme, written on by numerous and clever mechanicians and lectured on before college classes, yet the making of an articulated denture, carrying mastication with exactitude and nicety to ideal performance, is seldom achieved by a majority of those who have to do this class of work. The fact is that edentulous mouths which require artificial dentures are so unlike and varied in shape and character as to demand of the operator close study into the laws of physical force that he may better apprehend the safe methods in constructing the work in hand. The edentulous mouth, into which teeth are to be inserted, should receive close study of its muscles, its repose, its play and its varied occlusion, either in over-bite or under-bite, or there will be more mistakes than Moses ever made. Take a case of mandibular protrusion and undertake to fix a denture and you have a worse problem to solve than the race question down south. Then those maxillæ with obliterated alveoli are equally grievous of mechanical construction. One who can take into his mental grasp all these conditions and evolve by his handicraft no errors is blessed above ordinary mortals in his vocation. A full denture, embodying all the requirements of the mouth, with accurate adjustment of teeth in length, comeliness and occlusion, and satisfactory alike to the operator and patient, so that the critical eye cannot detect the artisan from the artist, and wherein taste and skill have been so united as to lay claim to a masterpiece of mechanism, is an achievement of which to be proud. My purpose is, in the points I offer, to aid those who have experienced difficulties in articulation and make some few suggestions which have valuably assisted me in daily practice.

In partial sets, or in full upper or lower dentures, where there are teeth, however few there may be, we have something of a guide in articulation; but in edentulous arches, where perhaps the teeth have long been lost, our only recourse lies in comparison and study of all the characteristics as when the natural teeth were in the mouth. After this consideration has been given to edentulous arches, and we have decided on their natural positions, built our models, placed these on an anatomical articulator with teeth set up in what we think seeming accuracy of occlusion, we find upon trial in the mouth that though the plates fit well, the antagonizing is in error, and rather difficult correction has to be made or a useless

appliance will result. An important point to be carefully noted, but too often neglected, is the selection of teeth with regard to the relative size of the six anterior teeth above and below. The six anterior teeth below should cover a space in width equal to the space between the cusps of the upper cuspids, leaving the distal half of each upper cuspid to cover a portion of each lower first bicuspid. A close observance of this rule obviates the necessity of much grinding to allow the teeth posterior to this point above and below to pass properly to their respective positions. In mounting teeth on the models, where normal occlusion is assured, the common practice is to allow the incisal edges of the lowers to lock just inside the lingual surfaces of the upper teeth, instead of leaving a space of from one to two lines between these two points to allow for lateral play during the incisive function. In abnormal occlusion, of either over or under bite to any marked extent, no set rule can be adhered to, every case being a law unto itself, but where the bite is normal certain laws should control the articulation of the teeth in order to obtain the most useful appliances as well as those of most natural appearance. We should remember that while the up and down motion, or the hingelike movement, is an important one, we want not only the crushing force of the jaws, but also that there are other motions of vital importance. One is the protruding motion during the act of biting, and provision should be made for that function by placing the upper teeth far enough beyond the lowers so that when this function of biting takes place the incisal edges of both jaws will meet, before allowing the lowers to slip back to their allotted places. There should be not only an over-bite of one line or more, but an over-lap also of the same amount, which is not always adhered to. This latter provision is important as it insures contact of the incisal edges during the incising function produced by the slightly protruding lower jaw at that time. Now, while this procedure may not be precisely in accordance with our great master, Dr. Bonwill, who contributed largely of his genius for our enlightenment to this specialty, yet there are hints arrived at from my own practical experience. Dr. Bonwill's articulator was the best of its kind for many years and served its purpose well, and while better and more scientifically constructed articulators are now on the market, they are simply the product of afterthought and improvement.

In passing beyond the six anterior teeth, I think it an error to retain in either upper or lower set a lingual cusp of much prominence on the first bicuspid tooth. I think in either jaw, especially the lower, it should be diminutive, thus corresponding more to natural teeth. The idea of the antero-lateral portion of the tongue, where it is the thinnest, being suddenly called upon to narrow itself down and confine its edges within the prominently projecting lingual cusps of the first bicuspid is wrong, as there should be a gradual slope from the thin incisal walls back to the broader grinding surfaces of the second bicuspid and molars, and in this respect the manufacturers should try to follow out nature's intentions a little more closely. Some sets of artificial teeth have this provision made, but those of later molds have both bicuspid alike in size.

It will be noted that as we pass still further back we see the molar teeth often misplaced, and no respect to the angles of force in mastication observed. The general fault or error seems to be a widening of the arch, and it is rarely if ever too much contracted. The molars on this account run out over the buccal sides of the ridges, and the plates are displaced in consequence during the act of mastication. The molars could hardly be placed in too far lingually, as all stress in mastication would be either towards the ridges or just inside, which would help to retain the plates in position. The common error of a faulty constructed artificial denture is the tendency of the molars to run out into the cheek where there is no stability nor room for the appliance and where the muscles and glands of the face are apt to fall between the masticating surfaces of the molars to an annoying degree. Anatomists tell us that in the normal occlusion of the natural teeth the entire upper arch is wider than the lower, and that the upper teeth all around should overlap the lowers. I hardly agree with those who say we should imitate the natural arrangement with our artificial teeth in this respect, for if we observe the great majority of edentulous arches we will note that the anterior portion of the upper arch describes a wider segment than the lower, while as the jaws extend to the rear the reverse is the rule. While I believe it proper to have the upper anterior teeth extend beyond the lowers and slightly overlap them, I think as we get to the bicuspid the buccal surfaces of both uppers and lowers should be on the same vertical plane, then as we get to the first molars above, they should be placed slightly inside of the buccal

edges of the inferior molars, and the second molars above should then drop into a position where their bucco-occlusal edges would strike about midway of the buccal surface of the second lower molars.

Summing up this arrangement of the arches, the upper should describe a wider circle anteriorly, and a smaller one posteriorly than the lower. I know that Dr. Bonwill advocated the arrangement of the bicuspid and molars in almost a straight line back from the cuspids, but that in many cases would land the last molar, especially in the upper, too far out into the cheek, and cause instability of the denture.

A NEW ERA IN DENTISTRY.

PRESIDENT'S ADDRESS, BY LEANDER VAN ORDEN, D.D.S., M.D., SAN FRANCISCO. READ BEFORE THE CALIFORNIA STATE DENTAL ASSOCIATION, MAY 16, 1904.

It is with a consciousness that the occasion itself will contribute much to the value of what there is time to say that I ask you to listen to a few words about a new era in dentistry. "Often in history there come definite epochs of change and well-defined eras of thought and action. There seems every indication that we ourselves are now living in such an epoch; that with the close of the past century and the opening of the new one great changes are taking place which will have a profound influence upon the future of society. * * * One of these changes is that along social and strictly humanitarian lines. Sociological questions are coming more prominently to the front. A great wave of interest in the changing of the condition of the people is sweeping over the civilized world. There is no doubt that economic conditions are to be in some way readjusted. The opening of the new century, with its unrest and its great emphasis upon the study of social and economic problems, is to bring a new order, the form of which no one can yet fully determine." "Prediction is indeed unsafe, because the world has a way of adjusting itself to new conditions in unforeseen ways."

In the light of these thoughts it seems but wise that we as dentists, with minds hospitable to new things, should consider how best we may meet and bear our part in the efforts for human betterment.

Who will question that dentists have large social and humanitarian functions to perform, or that their scientific, artistic and technical efforts will be the more successful when carried on in a large-minded spirit? While such definite epochs of change seem to come on as in a night, it is probable that reformations and new departures and new eras are but the accentuated and more fully developed expression of convictions that have slowly taken form in the minds of a group of men and are but rarely confined to an individual experience. It is true that powerful kings, or great prophets and poets place the mark of tremendous energy, or sagacity, or great insight, or wonderful powers of imagination upon their times; but they use the materials that have been gathering through long years or centuries.

Geniuses in any art idealize and individualize that art and imbue it with an intense and absorbed personality. The work of such men bears a stamp. A dentist may be much less than a genius and yet give to his work the stamp of excellence. His patients' mouths show his handiwork and attract the interest of other dentists, and happily of the patients themselves. It may be evidenced in beauty of form or exquisite finish; in some bold departure from conventional methods, as in crown and bridgework; the adoption of a not-too-popular material to fuller and more intelligent use, or the striking out into hitherto untrodden paths.

New eras always involve a break with conservatism. This Union Clinic would not have been possible if the long list of useful and time-honored committees had not been entirely left out of count for the time being. New departures dentistry has had more than once in its short modern history, and it will have them over and over again. Dr. James Truman, writing of the golden anniversary banquet to the class of 1854, and being one of its members, anticipates that this present year will bear no relation to that of 1954 in its ability to meet all of the requirements of a scientific profession. Be that as it may, we can meet but one era at one time, and it is just as certain that we here and now can and will provide material for future eras to be built upon.

As eternity itself is said to begin with each day, so a new era may begin with any man on any day. The significant elements may be brought out by contrasting one's days of pupilage with the present and realizing how gradually some of the most marked changes were established. An even thirty years ago the writer recalls that the

leading dentists of San Francisco concentrated their efforts upon the production of gold fillings, and plate work was accepted by some almost under protest. A wooden-pivot tooth was occasionally inserted, anesthetics were but rarely given for extraction, and local anesthesia was limited to the ether spray. Hill's stopping, so-called, was the main resource for temporary work, and Lawrence's was the best-known amalgam, the use of which was often accompanied by an apology. Oxychlorid of zinc cement was used with confidence in capping pulps and filling canals, and experimentally for fillings. Quite naturally the main qualification demanded was the ability to insert presumably permanent fillings of gold, of almost any size, no matter how conspicuous, in almost any part of the dental equipment. The care of the gums and sockets was earnestly met by a few, while bicuspid and molar teeth subject to abscess were not too zealously preserved by the majority. A year before this time, in 1873, the gold crown was patented in San Francisco by Dr. Beers, Sr. Being patented and so radical a departure, it made but slow progress locally. A few years later, in 1877, I saw one of the newly patented Richmond crowns in construction in the office of Drs. Cochrane & Richmond. Those crowns had wide bands exposed and did not become rapidly popular among dentists at first. Nor did bridgework, which might have been the logical outgrowth of these two crowns, find an enthusiastic reception here, as it was criticized because of clumsy construction, misfits and resulting bad odors. What California's dentists really did achieve during the '70s and early '80s seems to have been a rather marked reputation for the excellence of their gold fillings. The Argonauts and their families certainly encouraged a high class of dentistry as understood in that day.

Having given the impressions received by an office boy of thirty years ago, imperfectly indeed and subject to the criticism of our little band of original members, and to correction through the first volume of the Transactions of this Association, I invite your attention to a few only of the things that seem more prominently to stand out in the making of our new era. International dental congresses are significant products of our day, and much thought will be crystallized at St. Louis this year. The Congress is frankly dental in its origin, scope and intent. May California do her part both intellectually and financially. A place of honor may well be given to the Dental Protective Association and to its founder, Dr. Crouse.

It has secured to us the peaceful prosecution of our work. No royalties have been collected and no checks put upon invention or the use of materials or of remedies for pain. Let us not grow careless as to the value of that Association nor let it die. Medicine seems to have outlived such dangers, but our highly mechanical vocation makes us vulnerable.

There is a slow but certain trend toward non-inflictive methods. A ten per cent solution of cocain always ready on the tray, to protect the gums and peridental membrane against both chemical and mechanical hurts, is a good foundation to begin with. The Northern Ohio Dental Association announces as its motto for this year: "The Annihilation of Pain in Dentistry." It is to have four clinics with cataphoresis. At our clinic hot-water and vapor-spray methods invite our serious attention. May abounding success attend them all! There is much promise in the use of nitrous oxid gas inhaled through the nose. Do we yet lack courage for a fuller use of this beneficent agent? Some patients need doses of bromid before leaving home and after reaching the office to relieve a sad and to them very real dread. That this dread is not so prevalent as in the past is encouraging—let it be ours to work for its entire eradication.

Pain makes it imperative that dentistry should be interested in experimental therapeutics, and disease now forces an interest in bacteriology. Remedies now placed on the market as the result of careful study prove that the heretofore too-irritating formalin gas can be so modified by creosol and other well-tried remedies as to help secure unexpected promptness of result in treating infected and abscessed teeth. A solution containing ten per cent of sulphuric acid combined with the same irritating gas, formalin, and modifying agents places in our hands a potent aid in the treatment of "pockets" which from any cause may exist between the roots of the teeth and the gum. Dr. J. M. Whitney of Honolulu reports splendid results after scaling from much stronger solutions of sulphuric acid, such as fifty per cent.

That crowns and bridges both of gold and porcelain are important elements in our era is made evident by the clinical program. To the writer the invisible "staple" crown for bridgework is one of the most interesting items. It is now the subject of litigation and the defense is being conducted by the Dental Protective Association. Please note this fact. Backings and cradles for facings and dummies

have been invented or perfected in this city. These permit attachment of porcelain with cement and without the display of gold.

Two other new era elements have of late been making unusual progress above the horizon line. They are porcelain dental art and orthodontia. Both are preeminently esthetic in nature, yet crowded with technical and mechanical details of absorbing interest in the happiest combination yet achieved. Is the porcelain inlay the ideal filling of your dreams? Whether it is or not, it is almost ideal in its comparative beauty and in the demand it makes upon skill and the exercise of a fine taste in the selection of shades. And now we have the orthodontia specialist—he who makes crooked teeth straight and distorted countenances beautiful; who bids fair to be a genuine aristocrat in the profession. Note the care with which his impressions and models are made and the truly wonderful results of his handiwork. Much should we learn from him, especially of dental and facial anatomy. Much should we cherish the labors of his predecessors, the earnest, hard-working, general practitioners, who did not shirk the then difficult and unremunerative work.

Time limitation now brings us to the youngest factor in this new era of ours. It has been trying to get over the horizon for some years past, and as often happens it had but one champion; it may ultimately have many and climb way up toward the zenith of great results. Up to the time that this new star appeared a dentist, could say to his suffering and impatient clients that he was not the cause of decay or pain in the teeth. From this time forth he may be more and more held to the charge of being an accomplice before the fact if he does not put forth reasonable effort in preventing decay in the teeth and disease in the gums of those patients who are willing to second his efforts. Dr. D. D. Smith has demonstrated that pumice-stone, vigorously applied with orange-wood points, will check or eradicate slight decay; will cure many cases of disease of the gums, and if applied to the teeth of very young patients will prevent decay altogether. It seemed incredible until Drs. Kirk and Darby told what they had seen, and remarked that Dr. Smith seemed to be the only man who had taken seriously the teaching of Science—that dirt causes decay of the teeth. Teeth treated by him undoubtedly presented an appearance of health and beauty not before exemplified. With a jar and a wrench indeed will one turn from the use of all of his armamentarium to a few scalers and to hand-polishing with

pumice-stone and a stick. If we delight in the polish of a piece of marble or onyx, why not in that of a tooth; if we are charmed by the tints of a perfect complexion, why not by that of a healthy gum, which may defy the ravages of age? The dentist can do more than others to make people look young and feel young. A woman feels old when her gums bleed, yet they never need do so. The breath may be made sweet or unnoticeable by polishing the teeth, and Dr. Smith says that grave constitutional disorders have disappeared under this treatment. The results are esthetic, hygienic and moral, placing the patient and dentist on a plane of improved respect and regard. The gum line bids fair to prove the neutral zone upon which dentistry and medicine will meet unreservedly in the interest of mankind. Try this new treatment upon a medical patient—some of them do not have clean teeth.

TREATMENT OF PUNCTURED ROOT CANALS AND SPLIT ROOTS.

BY JOSEPH HEAD, D.D.S., PHILADELPHIA. READ BEFORE THE SOUTHERN BRANCH OF THE NATIONAL DENTAL ASSOCIATION, AT WASHINGTON, FEBRUARY 23-26, 1904.

The treatment of punctured root canals in the past has been fraught with the gravest difficulties. When the sterilizing of the canal extends through a series of sittings blood serum weeps in on the cotton dressing through the puncture during the interval between the treatments, thus rendering all efforts at antisepsis practically futile. Whenever a canal is punctured, whether through the end or through the side, mastication makes the gum tissue gradually enter the opening and in time partly fill the canal, leaving the neck of gum where it enters in a position to be constantly lacerated by the ragged edges of the puncture. This constant laceration causes a chronic inflammation which affects the health of the entire peridental membrane. When there is a large, undeveloped, unfilled apical foramen the conditions are similar.

The remedy for either of these conditions is obvious. The gum that has grown in the canal should be removed, the puncture sealed with a bland cover that will not project through the opening into the gum, and the canal sterilized and filled. Let us first discuss the means of restoring to a normal condition a canal that is punctured

on the side. Cocain should be first inserted and the gum within the canal thoroughly reamed out so that the canal proper beyond the puncture is readily discoverable with the broach. Adrenalin is next to be applied until the bleeding ceases, and the canal washed out with peroxid of hydrogen until effervescence stops. Care must, however, be taken to provide free vent for the effervescence of the peroxid or bad laceration of the periosteal tissue may occur. Then we are ready to construct the dam within the canal which shall stop up the puncture and prevent the gum from ever entering again. The canal should be dried thoroughly, and then a piece of inlay platinum foil, longer than the canal, should be wrapped in a tight coil about an inch from the end of a smooth broach. The broach should be inserted into the canal past the puncture, and the coil of platinum guided down the broach past the opening into position. An instrument should now be placed against the edge of coil to keep it in position while the broach is being removed. We now have the coil of platinum within the canal, extending toward the apical foramen beyond the margins of the puncture. The next step is to uncoil the platinum and spread it out over the walls of the canal and the opening of the puncture. This can be easily accomplished by inserting a spiral broach to the bottom of the coil, and twisting backwards until the coil is partly untwisted. Then once more steadying the platinum to keep it in position the spiral broach is withdrawn, and after being wrapped with cotton is again pressed down into the coil, spreading the platinum firmly and evenly against the walls of the canal. While the broach is in the canal the portion of the platinum that extends above the mouth should be belled out in every direction and flattened down on the pulp-chamber floor. Keeping the broach still in position, oxyphosphate of zinc is flowed all over the floor of the pulp chamber, covering the platinum and surrounding the broach. When this is almost hard the broach with its cotton can be withdrawn, leaving a canal that has been restored to normal conditions, and which can be treated in any way that seems advisable.

Abnormally large foramina usually occur in the upper incisors where the tooth has been broken and the pulp destroyed before the dentin in the root has been normally developed. In cases of adults, where the death of the pulp occurred between the ages of seven and ten, the best method of treatment is to go through the alveolar process, expose the tip of the root, wash the canal thoroughly with

peroxid of hydrogen, dry and fill with gutta-percha, and finally smooth off the tip of the root through the opening in the gum. This makes a clean, efficient, permanent operation. However, where a child of seven or eight is brought to us with the upper incisor broken and the pulp exposed the case is more complicated. In the first place the child will not consciously submit to the operation, and even if ether be given the tips of the roots are so far up under the nose that great cutting and much laceration would be necessary before they could be exposed and the canal filled by the method just described. Therefore, not being able to do the best we are compelled to do the best we can. The great difficulty lies in not knowing just how long the canal really is, just where the foramen lies, and how large it is. This difficulty is the same whether the pulp has been dead for a year or is alive and has to be killed. If the canal has been empty for some time the constant force of mastication will drive the gum within the enlarged foramen, sometimes to the distance of one-eighth of an inch. If the pulp has to be destroyed it is difficult with such a large stump to tell just where the pulp within the canal ends and that outside begins. There are two ways of dealing with this problem. The first is to take an X-ray picture of the root, carefully measure the length on the skiagraph, and then fill up to the length shown, first making an application with cocain to allay sensibility. The second method is to cocainize the tip, and with a hooked broach reach up and catch the end of the foramen. Having thus obtained the measurement, fill up according to it, not according to the sensations of the patient. In either case it is wise to have an X-ray picture taken after the operation to see that the tip is perfectly filled.

Should a fistula have formed it must be treated and cured before the root is filled. In this case thorough syringing with peroxid, drying, and pushing of a small amount of iodoform or aristol paste into the gum beyond the foramen will tend to cause rapid healing and ensure temporarily at least the perfect filling of the tip. External injections into the fistula of carbolic, sulphuric, or trichloroacetic acid will often be of great benefit, and heal up a bad tip sufficiently to keep the root safe until adult life is reached and a radical surgical operation can be done.

There is another way of treating punctured roots that is very simple and has much to recommend it. Curet the canal wall of all

gum. Make the entire canal straight and conical, and while it is wet press in a plug of warmed high-fusing gutta-percha until it absolutely conforms to the shape of the canal. Remove the plug and wash it in alcohol, wash the canal thoroughly with peroxid of hydrogen and dry. Place a little iodoform or aristol paste in the tip, slightly moisten the sides of the gutta-percha plug with oil of cajeput, and press it firmly into the canal. The iodoform paste will fill the apical foramen, and the hard gutta-percha will seal the opening of the puncture without having the slightest tendency to protrude through into the pericementum. In cases where patients come with the bottom and side of the canal drilled out the method just mentioned is the only feasible one. One such case occurs to me where acute inflammation and soreness were rapidly and permanently overcome by the insertion of such a gutta-percha plug.

The treatment of split roots varies according to the amount of the fracture. Where the piece broken is small it is much better removed and restored with amalgam. Later the edge of amalgam under the gum can be smoothed and polished and a band crown attached. Where a single root is split down the middle the two loose pieces should be firmly tied together around the neck with floss silk. The canal should then be washed thoroughly with peroxid, dried, soaked in nitrate of silver to prevent the cracked lines from decaying, the two separate sides of the canal dovetailed and undercut, and the whole filled solidly with amalgam. When the amalgam sets the floss silk can be removed, and the root then be capped with a band crown in the ordinary way.

In cases of small fracture of the root under the gum the amalgam restoration is better than running the band of the crown below the fracture, for the amalgam can be smoothed deep below the gum, while the edge of the band of a crown is practically sure to prove a source of laceration and infection. It is sufficiently hard to fit a band properly under the most favorable circumstances, and where the root has been fractured it is of the utmost importance that all irritating or infectious conditions should be prevented.

Where a firmly imbedded root of a molar has decayed away from the rest of the tooth it can be rejoined by drilling a hole through the crown in the line of the canal of the disconnected root. This root canal is then enlarged and cut with a screw thread, cement is placed in the canal, and a How German silver post screwed into the

canal through the hole in the crown of the tooth. Then the post can be cemented firmly to the crown and cut off level with the grinding surface, and the decayed part of the root restored with amalgam. Of course it is better to sterilize and remove all decay before the screw is inserted. The opening in the crown which contains the screw can be filled with either gold or amalgam as seems most advisable.

Where one of the roots of a molar has necrosed it is better to cut off the entire crown, remove the necrosed root, and build up a smaller crown on the remaining root or roots. Where the lingual root of an upper first molar has to be removed the two buccal roots make an excellent foundation for a crown that appears in every way from the outside of the mouth like the original tooth, only being narrower in its bucco-lingual diameter.

Where the crown of a lower molar has decayed away so much that little but the roots is left, and a sudden bite breaks them apart, screw threads should be cut in the canal of each and screws cemented into position. These screws should be wired firmly so as to bring the roots into correct position, the cavities in the necks of each should be dovetailed and undercut, and the whole restored with amalgam so as to make a perfectly smooth stump for the reception of a band crown. This amalgam can often be inserted soft on top of creamy cement, which is squeezed out as much as possible. Then the filling is finished with amalgam dried of its mercury in the usual manner. This is the method many good operators ordinarily use to insert amalgam.

When the two roots of a lower molar are split apart so far in the gum as to make it impracticable to draw them together, it is often advisable to use the crown as described by Dr. Goslee, that is, to band each separately, join the approximal edges of the band near the cutting edge, and place a single grinding surface over the two, thus getting the rigid support of both roots, and making it possible to cleanse the necks of each perfectly with toothpicks and antiseptic washes.

DISCUSSION. *Dr. J. Y. Crawford*, Nashville: There is much more to be done with mutilated roots than the profession appreciates. We do not realize the tolerance of the gum structure to perform vicariously the functions of the original teeth. A full appreciation of this would enable us to see the value of surgical procedure in

such cases. I prefer lead to platinum, and instead of lining the entire punctured root I would use just enough lead to cover the opening. I have a case in mind which illustrates the possibilities of treating punctured roots. The tooth was a central incisor with a loose crown in the mouth of a woman. I removed the crown and found serum inside. With an exploring instrument I detected increased hemorrhage and noted blood and serum oozing from both the distal and the mesial side of the root, and determined that the discharge did not come from the pulp canal. Funneling the tooth with a barbed broach I entered the canal and found a root that had not been opened. The patient stated that the tooth had been filled and that the ordinary response to thermal changes was noted. That dentist pronounced the pulp diseased, opened it up from the mesial surface and went out under onto the distal aspect. The next dentist went out on the mesial side, and the third one cut it off and put on a crown. I opened up everything freely and placed a covering of lead over the two windows, cementing the discs in position. I then put on a crown, and when the patient called on me a few days ago she was still wearing it.

Dr. R. H. Hofheinz, Rochester, N. Y.: I would warn the younger men against the use of any cement against these punctures. I have had cases which have proven to me beyond question that gutta-percha is the only material which will not disintegrate if there is any possibility of secretions getting into the pulp canal. In one case after replantation, the root having been filled with gutta-percha, entire absorption of the root occurred, but the canal filling remained intact. In another case only a partial absorption took place, but the entire root canal was empty, which showed that all the cement had been dissolved in the canal. Another method is to burnish a thin platinum cap over these punctures and then fill the entire root with gutta-percha, so there is no chance of it getting through the puncture.

Dr. W. V-B. Ames, Chicago: I would say that my own experience and that of other people with punctures have shown that they can be very well sealed with oxyphosphate of copper, and after the usual trials with oxyphosphate of zinc and gutta-percha the copper was used with satisfactory results. After pressing back the tissues with dressing-seal gutta-percha a film of oxyphosphate of copper will bring the parts to a comfortable condition.

Dr. Wm. Crenshaw, Atlanta: This idea of closing the openings obviates difficulties which we have all met, and the suggestion is valuable. I never heard of a root of any kind in such a fix as the one Dr. Crawford mentions. The nearest approach to it which I recall was the experience of an Arkansas dentist, who told me that he once had a root with openings on four sides and one in the end, and that he did everything he ever heard of for it, but at length had to pull it out. He then whittled out a tooth from a piece of Mississippi River bottom scaly-bark hickory and fitted it into the socket. It took root and became firm, but during the fourth year it bore a crop of scaly bark which almost choked the patient to death and he had to pull it out.

Dr. Head, closing discussion: As regards Dr. Crawford's suggestion, lead is bland and most acceptable to the tissues, but I should think it would be difficult to tell whether the edge ran off into the pericemental membrane or not, and with that idea I use the platinum tube to obviate any such possibilities.

PARALLELISM OF SOCIAL AND PROFESSIONAL EVOLUTION FROM THE INDIVIDUAL'S STANDPOINT.

PRESIDENT'S ADDRESS, BY GEO. S. VANN, D.D.S., GADSDEN, ALA. READ
BEFORE THE SOUTHERN BRANCH OF THE NATIONAL DENTAL
ASSOCIATION, AT WASHINGTON, FEBRUARY 23-26, 1904.

Modern society is a vast organism full of conscious life and energy, in which each man bears a definite and vital relation to every other man, and is himself formed by the spirit of the age of which he forms a part. That this statement is not hyperbolic in its nature can be readily seen if we but pause a moment to reflect upon the highly organized civilization of to-day, in which modern transportation and communication have abridged distance and brought the remotest parts of the earth into close relationship. As a result the continents vibrate with swift communion of sentiment, the zephyrs waft intelligence from country to country, the waves roll it from shore to shore, and information is circulated in electric currents from nation to nation. Energy of mind, genius and power, wherever they exist, may speak out in any language and the world will understand, for the universe has become a common field for man to operate in, a market place for the exchange of intellectual discoveries.

These external conditions of society are patent to every mind, so much so that our very familiarity with them occasions us to doubt the frank statement of the sociologist, that the best of us are very ignorant of the inside facts of social life, that the majority of people have yet to be convinced that the study of society is important, and that only the exceptional few have realized, for example, that part of our own life is lived by people miles and miles away whose very names we have never heard. Because certain men in Montana or Australia have raised a particular breed of sheep, we are enabled to wear some parts of the clothing upon our bodies at this moment. Those people have been dressing us for years while we have given scarce a thought to their existence. Who puts fork or spoon into our mouths at to-day's dinner? Not our hands alone. Some men have been raising wheat in Kansas and potatoes in New Hampshire, others have been boiling salt in New York, picking coffee in Java, and gathering spices in the isles of the sea; porters have carried lurdens on their backs and loaded on drays; officials have inspected, merchants have sold, and domestics have labored—all in the course of setting our table. If these thousands of people in our own land or beyond the seas should stop living and working, great sections of our own life would cease, for we human beings are what we are and enjoy what we do because we are parts of a complex social whole.

Again, few people have ever reflected that a part of their lives was lived a decade, a century, a millennium ago. Our life is not all to-day and to-morrow. Its yesterdays are just as really a part of it as are any of its present moments. Society is like Tennyson's brook, as, of course, the poet meant for us to interpret his lines—society, too, goes on forever. People are the bubbles on the surface of the brook, but each bubble is a part of it. Each is what it is because of the bed which the brook has been ages in wearing; because of the course of the brook to the spot where the bubble was formed; because of the soil on the bank; the force of the stream; the sunshine or cloud in the sky. In plain prose, our lives, ourselves, are atoms of the life of humanity that has been working to form us through all ages.

Suppose one of us should have been cast in early childhood upon a Robinson Crusoe's island. Suppose the waif were bare, without tools, without provisions. He would not be then entirely uncivil-

tured or absolutely unskilled. He would carry rudimentary civilized tastes and the beginnings of social traditions. Cut off from the body of that tradition, however, he would not come into his inheritance as an heir of the ages. He would have to begin where primitive man began and live the fragmentary life that all men had to live before life upon life had accumulated facilities and capacities for living. He would have to learn everything about the resources of nature and their uses. He would have to acquire all the arts and crafts and mysteries by which the world's workers have wrought over raw material for human uses. Thrown back upon the necessity of doing all his living for himself, he would need thousands of years to acquire the tastes, develop the wants, and learn the skill to provide for himself the food, clothes, tools and comforts that the ordinary civilized man requires. Therefore, in our brief term of existence, we have much larger life by being sharers of all past life.

What is true of the individual life has a thousandfold larger meaning when applied to national life. Take for example this continent, a wide republic, the youngest member of the great family of nations. Its history runs back to the postdiluvian period when the great Aryan family began to stir itself in the early morning of the world for that great westward movement in the course of which empires, kingdoms and republics were founded. Standing as it does, the last of this long and majestic line of governments, the American republic has the advantage of profiting by the failures and successes of all the systems that have vanished, and of making a part of its own vital organism those elements which have added to the greatness and perpetuity of its predecessors.

Washington, the capital city of the nation, has been made the visible embodiment of these elements. In her congressional halls centralized national power is evenly balanced by the representative rights of sovereign states, thereby securing peace, order, equity and freedom to all within the nation's boundaries, and shedding light, hope and joy upon the pathway of human liberty throughout the world. Long may the noble city endure, as the ever-living monument of constitutional liberty, so that in the fullness of time the prophet-statesman's famous dream of the political union of the American continent under one flag, with one speech and a common jurisprudence, may be fulfilled, and the islands of the sea which have come under her dominion may be made to rejoice that they have

become stepping stones toward the entrance of the United States into world politics.

Summing up these thoughts in their relation to the present and future, we are happy in being permitted, under circumstances so auspicious, to assemble within the gates of the capital city, and under the inspiring influence of associations historic and patriotic address ourselves to the study of those social forces which have formed us and our opportunities, trying to learn thereby how to take a little wiser look into the present situation, and how to calculate the possibilities of life a little more broadly and deeply.

When we lift a corner of the veil which hides from us the primitive condition of mankind we find that human relationship or society had its origin in the family life. And as the care of childhood lengthened—where several children were successively born to the same parents—the ties between father and mother, sister and brother, became firmly knit, affording opportunity for the growth of the sympathies and the development of the reciprocal duties between the various members, and the judgment of action as good or bad by some other standard than selfish desire.

The rudimentary growth of the moral sentiments having in this way been given definite direction, they began to play an important part in the progress of society, scarcely keeping pace, however, with the general development of intelligence and quick-wittedness, for the reason that the advancement of civilization has been largely effected through strife, through the continuance of that deadly struggle of natural selection which has been going on ever since organized life first appeared upon the earth.

This can be easily understood when we remember that with primitive man food was the prime necessity of life, and as long as food was obtainable only by hunting and fishing, or otherwise seizing upon edible objects already in existence, chronic and universal quarrel was inevitable. This condition meant everlasting slaughter, and that the fiercest race of fighters would survive and perpetuate their kind, but in the midst of this strife there was one exception—the family life supplied the motives of peaceful cooperation. Within its limits interdependence, fidelity and forbearance had their uses, for events were not long in showing that the most coherent families would prevail over their less coherent rivals. Thus the family became the organized unit of society, and in time secured a determinate

development for that class of human emotions, sympathy, and the concomitant altruistic or ethical feelings, which could thrive only through the elimination of strife. Evidence of the universality of this fact is seen in the later history of mankind, which during the past thirty centuries has been characterized by gradual cessation of strife, although the process has gone on with such extreme slowness that at the present day it is only by surveying human history from the widest possible outlook that we are enabled to distinctly observe the tendency.

However, in speaking of the higher ethical feelings as being antagonistic to the continuance of warfare, it is not meant to imply that warfare could ever be directly overcome by horror of cruelty or moral disapproval of strife. The actual process is much more indirect and complex, as will be seen by the following steps towards civilization. Sensation and experience were the only sources of primitive man's mental evolution, but by the constant exercise of his wits in the struggle for existence he was presently enabled to devise other and better methods of obtaining food. During intervals of peace families grouped about a common ancestry, and sojourning in a fertile region, learned to till the ground and rear flocks, and when they proceeded a step further and exchanged the products of their labor with one another, a new and profound movement was made toward a higher social state. Whereas, the only conceivable bond of political combination had heretofore been blood-relationship, a new basis was now furnished through industrial activity, commercial exchange and contiguity of territory. Food supply was no longer necessarily a bone of contention, for it could be indefinitely increased by peaceful industry, and furthermore, in the free exchange of the products of their labors it ceased to be true that one man's interest opposed another's. Of course men did not at once recognize this fact—indeed, they have not universally as yet, so accustomed are they to interpret the conditions of life in accordance with the traditions handed down “from time immemorial, when the means of subsistence were strictly limited and one man's success meant another's starvation”—but the series of changes toward industrial civilization had set in, and the tribes or clans who earliest learned the value of community of occupation were not long in overcoming their neighbors and flourishing at their expense, for agriculture, aside from supplying resources, allows a vastly greater population to

live upon a given area, and in many ways favors social organization.

Bearing these facts in mind, it may be interesting to note the rise of the priestly class as the origin of the intellectual element in social progress. The idea of religion is recognized as coordinate with human development, and that devotees of the altar might spend all their time in ministrations to and propitiation of the tribal divinities, the remainder of the population began very early to supply them with the means of subsistence. Not being called upon to work for a living, the primitive priest had full opportunity for the acquirement of cunning and skill, and that acquaintance with the nature of things which gave him the ascendancy over his fellows. Since his power as priest was greatly increased by the exhibition of those feats and products which exceeded the understanding of the people, he was under a constant stimulus to gain the superior culture and mental power requisite for their performance.

Hence the impulse given to intellectual labor and discipline which has come to distinguish the professional callings as such from other occupations. When we come to consider the professions separately, we find that of medicine was largely in the hands of the medicine-man of the tribe to begin with, who through pretended connection with supernatural beings claimed the power to charm out diseases and evil spirits, and to ascertain by suggestive means who was responsible for criminal acts, thus blending his with the priestly character and fixing the status of medicine as an intellectual calling. Alongside the medicine-man, however, there grew up a rude medicine which was engaged in by both men and women who were dependent upon their knowledge of the healing virtues of plants and herbs, and so were more in line with scientific medical practice. With the natural development of knowledge in a growing society the medicine-man who continued to work on the suggestive basis was gradually displaced by the lay specialist who, operating on scientific or empirical principles, laid the practical basis of the profession of medicine in all its branches.

Such were the beginnings of civilization, in which the industrial, ethical and intellectual forces were given definite direction, and out of the exigencies of which, continually increasing in complexity, have proceeded, directly or indirectly, all the arts and sciences which have given to modern life so much of its interest and value. But more important still has been the consequent development in the

ethical field. Industrial activity having furnished a wider basis for political union than mere blood-relationship, the area within which moral obligations were recognized as binding was proportionately enlarged. At first confined to the family, then to the tribe, the idea of duty came at length to extend throughout a state in which many tribes were combined and fused, and as it thus increased in generality it became immeasurably strengthened and ennobled.

This coalescence of small groups of men into larger and still larger political aggregates marked the rise of the ancient empires and was the key to further human progress. Advancement along this line was made under unspeakable difficulties, due to the fact that the principles of national life were being evolved one by one out of the depths of human experience, each civilization being but an expansion of one of these elementary ideas. Egyptian greatness, for example, was built up about the idea of material aggrandizement, to which fact the colossal ruins on the upper and lower Nile bear silent testimony even unto this day. The Jewish civilization was a result of religious inspiration; the Greeks emphasized culture, the Romans law or government. Elsewhere you meet with other organizing principles which in turn determined the order of civilizations, but everywhere such development was one-sided and brought monotony in its train. To this cause may be attributed the character of tyranny which appeared among all ancient governments. Society belonged to an exclusive power which would permit the existence of no other. Every differing tendency was proscribed and hunted down. Individual life consequently counted for nothing. Education and training aimed not at the development of a perfect man or woman, but to prepare subjects for their places in the established order of things. This sacrifice of the individual to an external, despotic authority which controlled his destiny, together with the method of national growth by conquest of neighboring tribes without admitting them to a share of the government—a mere robbing them of their military strength and the fruits of their labors—brought together a mass of human beings virtually enslaved. Such states degenerate rapidly in military strength. Their slavish population, accustomed to being beaten, starved and massacred by the tax-gatherer, loses all courage and patriotism. To strike down the executive head of such an assemblage of enslaved tribes is to effect their conquest or dissolution. Hence the history of ancient peoples is characterized by sudden and gigantic overthrows.

Rome was the last exponent of ancient civilization, and by her conquest of the known world she was enabled to gather upon her seven hills the sum total that remained of the religions, ethics, laws, customs, languages, arts and sciences of all nations of antiquity which had successively held sway or predominance. Therefore, as we approach the decline and fall of this great empire, due partly to the overwhelming invasion of barbarian hordes and partly to internal decay, it would seem that the channel of progress would suddenly disappear like an underground stream, and its very source be lost in the turmoil and darkness of the ages following.

Not so, however, for just as the empire reached its zenith of power, and peace prevailed throughout the world, an event occurred that has thrilled all successive ages—the Christ was born in Bethlehem of Judea. This event was unheralded at Rome, but it was filled with profound significance for that world-power in which might meant right, for He came teaching the value of the individual as a unit of service to and salvation of the race, and summed up all human relations and ethical codes in the simple formula: "Do unto others as you would be done by." The influence of such an idea as that of the Divine-human God condescending to assume the sorrows and trials of mortal life, all for the sake of the elevation of individual souls, the humblest and weakest as well as the mightiest and most exalted, was indeed potent to transform civilization, and this consideration for the individual in his imperfection has acted as a permanent cause to effect the relation of the directing and controlling powers in human society to the masses beneath them. Henceforth the whole policy of the institutions of civilization—family, state, church—becomes more and more one of tender nurture and development of individuality as the highest object to be sought by humanity.

We must not understand this progress to have been uninterrupted in its course, for the early society of Christian believers, centralizing itself in the heart of the Roman Empire, soon began to partake of the nature of that government, and to such a degree that by the close of the fifth century Christianity was no longer a religion of individual belief, but the organized church of Rome, with a pontifical head, constituted clergy, mediatorial priesthood, revenues, means of independent action, and national and provincial councils.

But the church as such had its mission to fulfill. It is clear that a society strongly organized and strongly governed was indis-

pensable to struggle with the overwhelming disaster of the falling empire and to issue victoriously from such a wreck. It is clear that the church of Rome alone could have gathered up and preserved within its cloisters the relics of ancient civilization, and, having conquered the invading barbarians by converting them, become the bond, the medium, the principle of civilization between the ancient and modern worlds.

This transfer of political power, and gradually of social and intellectual precedence, from the law-abiding Roman to the freedom-loving Teuton extended from the Fifth to the Fifteenth centuries, marking the character of the Middle Ages as preeminently transitional. It was the kindergarten period of the great nations of modern Europe, during which ancient reverence for imperial majesty still obtained, but the latter was offset, through the rise of the feudal order, by a vast extension of the range of social and industrial activities in those directions where adjustment to environment was felt to be least complete, thus leading up to the crowning historical event of an evolution of a thousand years—that of the revival of learning. This intellectual movement, beginning among the upper strata of society, worked downward until it reached the people, developing in each nation a distinct and characteristic phase. In Italy thought turned to art; in France to philosophy; in England to literature; in Spain to exploration, resulting in the discovery of a new world for civilization, and in Germany, where the printing press had made the Bible the book of the people, the Reformation followed, bringing the individual back to a sense of his personal relationship to God, as taught by the Founder of Christianity, and making the great protestant declaration of the “divine right of private judgment.”

Stimulated and emancipated by greater intellectual freedom of inquiry in religious matters, men began to scrutinize and discuss the whole theory of government, and they grew restless under the arbitrary rule of earthly sovereigns as their minds rose to the conception of their supreme obligation to a higher law; to a power above the will of king in the state and of pope in the church. But the natural growth of the people toward greater political and religious liberty was met by formidable opposition, both on the part of church and state, the former entering upon a series of cruel persecutions and martyrdoms, the latter flaunting the “divine right

of sovereignty" in the face of an exasperated populace. The people of the Reformation, however, were in no mood to hear of any right divine to compel the individual's conscience and the individual, having encountered two centuries of religious and political storm and stress, had emerged strong enough in the consciousness of his rights to assert them. He had faced the universals which had commanded his respect—the church and the state—and in searching out their majesty had become conscious of his own. Out of this passionate sense of the worth and dignity of manhood and the growing conviction of human brotherhood came the blood and violence of those social upheavals which ushered in the modern democratic era. Men were possessed with a fever for the rights of man, they dreamed of the wholesale reorganization of society for his benefit and the coming of an idyllic Golden Age. This could never be realized in the old world bowed down with superstition and intolerance. Hence the era of colonization set in, directing the mighty ocean current of religious and political freedom from the shores of Europe westward until it washed the coast of the new world and channeled its way from sea to sea across its broad expanse.

Many things were uniting at this time in an imperative demand for the speedy civilization of the new world. Besides the further development of the individual and the expansion of the race, the growth of commerce called for it; the awakening of new thought and genius solicited it; the advancing sweep and sway of christian ideas necessitated it. Never before in the history of the race had there been so imperative a demand. We do not speak of the ambition of an Alexander or a Cæsar which sighed for new worlds to conquer, but of the legitimate needs of a growing, advancing humanity.

In response to this demand the settlers of the new world, the founders of the American Republic, came, bringing with them four great ideas to be worked out in the new civilization—government, material prosperity, religion, and culture. Government in their minds naturally took the form of a democracy in which all men were free and equal; and democracy formulated itself in the Declaration of Independence, the Constitution of the United States, and the institutions of a representative self-government.

The free-play of those voluntary activities appropriate to a de-

veloped individuality having been definitely secured, man now concentrated his powers upon the conquest of his material environment. As a consequence the spirit of industrialism and commercialism dominated all the activities of the past century, but the extraordinary progress of invention, the application of machinery to wealth production, and the rapid increase of cheap transportation facilities, developed entirely new economic conditions. As a result we have enormously increased capital and production, the concentration of large masses of people in cities, the growth of social, professional, and commercial organization, and the combination of labor and capital. The vast industrial development of the nineteenth century was based on individualism, but its results and tendencies have been distinctly social, its progress consisting in having laid material foundation for the development of the race through social and economic organization.

Thus one century prepared the way for advancement in the next, and scholars, recognizing the orderly sequence of history in the passing from industrial development to the ethical adjustment of human relations thereto, and believing that man had reached a point where he could plan out and create for himself a higher type of civilization, set themselves to making independent investigations of social conditions and relations, with a view of getting behind popular notions, conventional ideas and metaphysical speculation, to the actual facts of social life and of then arranging these facts in a systematic way after the truly scientific fashion. This was the beginning of a new science, that of sociology, which has a three-fold object: (1) To find out what the actual social world is. (2) To discover the real social world that ought to be. (3) To reveal the ways and means of changing the actual into the ideal. As a basis for this social philosophy Prof. Albion W. Small has reduced human welfare to six essentials, health, wealth, sociability, knowledge, culture and righteousness. When we consider that every individual is a more or less highly organized demand for these satisfactions, and that all associated life since the mating of the first pair down to the establishment of the republican form of government has been first an instinctive and then a deliberate effort to meet these requisitions, it is plain that the solution of the foregoing social problems is the great task which has been laid upon the present epoch of the world's history.

The dental profession in its relation to the public health is one of the factors of the great social process, the laws governing its development working in harmony with and being as fixed as those determining social evolution. In support of this fact Herbert Spencer has said: "One of the conclusions at which we arrive is, that in every branch of knowledge we must proceed from the empirical to the rational, a leading fact in human progress being that every science is evolved out of its corresponding art. It results from the necessity we are under both individually and as a race of reaching the abstract by way of the concrete, that there must be practice with an accruing experience, with its empirical generalizations, before there can be science. Science is organized knowledge, and before knowledge can be organized some of it must be possessed." Every science should therefore have a purely experimental introduction, and only after an ample fund of observation has been accumulated should reasoning begin.

Such was the history of dentistry from the gathering of the first herbs by primitive man, when medicine was still connected with the priesthood, to the treatment and restoration of the teeth, which became a specialized art coordinate with ancient civilization. After the fall of Rome, however, the curative art, following the course of events, together with learning and the sciences sank to the level of the invading barbarians. Here again we find the healer closely associated with the priest, following his lead in excommunicating recusant members, until better counsels prevailed and redemptory methods were adopted. In the church came discipline and rectification instead of exclusion and abandonment, and on the part of the healers treatment of organs and parts instead of amputations and excisions, and in contagious diseases seclusion and care instead of banishment as unclean and therefore unworthy of help and sympathy.

After the lapse of the Middle Ages there was merged out of the rule of priest and king—holding sway as by divine endowment—the classified order of the professions: Divinity, law and medicine. Then followed the specialization of medicine, which movement was in harmony with the developments of the centuries succeeding the Revival of Learning, the intense individualism of the eighteenth century being pertinently illustrated by the attitude of the practitioner of dentistry, who isolated himself and labored behind closed

doors both as operator and teacher, undertaking the latter work only for large fees and long service. In time competition arose upon this point, reducing the term of pupilage and compensation demanded, until certificates of qualification were granted after a few days "devoted to the copying of recipes and handicraft tricks," in the back room that served as workshop and college. Charlatanism and incompetency naturally resulted, and the professionally inclined practitioners of dentistry were led to attempt the establishment of a department in a medical school. This privilege being denied them, those pioneers, having a common interest and therefore a common principle of action, associated themselves in securing a charter for an independent dental school, thus opening the way for the organization of the dental society and the publication of the dental journal.

Since this important declaration of independence, which act was also strictly in accordance with the spirit of the times, being the second made upon American soil within half a century, the progress of dentistry has been synonymous with the material progress of the nation. An era of research, invention, and discovery set in whereby we as members of the profession have had our powers immeasurably increased. We use better instruments, work with more ease, operate more rapidly, see more clearly, understand more thoroughly, cause less pain, and are enabled to preserve those organs the lesions of which called the dental profession into existence. But as important as these results are, they are not the chief reason for congratulation. Through intellectual activity the province of the profession has been enlarged, its capacity multiplied, a scientific basis furnished, and the members having risen in the scale of being are prepared, by the partial organization of their forces, to pass out of the narrow ruts of individualism into the broad professionalism of the dawning century, thereby keeping abreast with the ceaseless march of societary progress.

That a movement so cosmic in significance has grown out of the organization of local, state, national and international bodies, the object of which is to "sift out and correlate the best factors of professional life, with the purpose of unifying them into the highest ideal," is deserving of our profoundest consideration. Therefore as we approach the date of the Fourth International Dental Congress, to be held within the year, it is the duty of every member of

the dental profession in America to regard the meeting not only as one in which he has a personal interest, but as one which involves also a personal obligation, to contribute of his ability, means and time towards its success. Furthermore, it is an occasion that transcends individual interest, and should therefore be made fruitful to the general good by a union of our forces for the advancement of scientific and professional interests, and for the display of that American hospitality due the representatives of an international congress, thus characterizing the meeting by a spirit symbolic of "the harmonization of the world's dental activities" toward which we progress.

This idea of association for unification as applied to progress in dentistry is the leaven which is at the basis of the present activity observable throughout the dental profession of the world today. Toward this end the closing years of the last century witnessed in this country the organization of the National Associations of Dental Faculties and Dental Examiners, the Institute of Pedagogics, and the amalgamation of the American and Southern into the present august body, the National Dental Association.

Before these bodies are already arising problems growing out of the ethical adjustment of professional life to the industrial development of the past century, namely, the unification of state dental laws, dental examination for life insurance, appointment of dentists in the army, the higher training of the dentist as a member of the profession and society, and popular education with respect to oral hygiene. Never within the history of dentistry has there come to the members of the profession so fruitful an opportunity for social service on a large scale as is offered by these movements on behalf of the public and the profession at large, failing to accomplish which we would fall far short of the twentieth century standard of our possibilities. Therefore as members of the Southern Branch I recommend that we put ourselves on record as favoring any definite action taken by the National Dental Association along this line, pledging our loyal support individually and collectively, both at home and in the congress of our fellows.

I also recommend that the constitution and by-laws of the Southern Branch be so amended as to correspond with those of the National Dental Association, and that a sufficient number of copies be printed and distributed among the members of this association, in

order that they may become conversant therewith. I furthermore recommend that a program committee be created and added to the list of standing committees.

As has been observed, the tendency in the social world today is to emphasize the individual as a member of society, as an institutional being, and as such in sympathetic touch with all mankind. The same is true in professional life. Hence it is of vital importance to the purposes of this Association that every practitioner of dentistry within its jurisdiction should accord to it his loyal support and cordial cooperation. Statistics are not accounted interesting reading, but if their interest were at all commensurate with their significance the fact that out of a little less than 30,000 dentists practicing in the United States a little more than 25,000 hold no associational allegiance—men of our own profession and traditions—would dwarf all others in importance. Let us at least bear in mind the figures which express the percentage of unorganized material within the limits of this and our respective state associations. Let us watch the decrease of this percentage, for these figures express the relation of light to darkness, of progress to decadence. With these figures constantly before us there will grow a clearer conception of what is to be done, and a more insistent determination through organization to bring out of the individualism, industrialism, and commercialism of the past century the noble order of cooperation as a profession in the service of humanity.

Social organization is a still further test of progress; it is a great conscience builder. Ability and technique are the mainstays of dentistry, but the ethical spirit of the society and association is the medium through which our profession has grown from "a mere adjunct of a trade to a body of men having the highest sense of loyalty to the profession, regard for each other, and duty to their fellow men." And now, whether we realize it or not, in many strange ways, by the alliance of nations, by armies and navies, by federations, unions, and trusts, by the growth of world politics and international arbitration, we are being taught the larger meanings of associated life, even the possibility of gaining a unified view of the world's progress, and the consequent recognition of that universal moral standard, whereby the individuals of the ever-increasing aggregates of mankind may have a just proportion of those cardinal satisfactions in life essential to human happiness and welfare.

Therefore when we pause a moment in the effort to visualize all past human activities in a perspective corresponding with reality, and consider that human life is interchange and interaction of all lives, we get a view of the world that turns out to be the theater of a plan of salvation far more sublime than the imagination of man ever conceived. The potencies which the Creator has put in men are finding themselves in the summary of human experience, and now with the accumulated wisdom of half a hundred centuries, with the functional organization of society, and the sympathetic cooperation of enlightened peoples, mankind is entering upon a social career prophetic of that age

"When the war-drum throbs no longer and the battle flags are furled
In the Parliament of nations, the Federation of the world."

ORAL SEPSIS IN CHILDHOOD, WITH ITS ATTENDANT EVILS.

BY BESSIE B. BENNETT, D.D.S., BALTIMORE. READ BEFORE THE SOUTHERN BRANCH OF THE NATIONAL DENTAL ASSOCIATION, AT
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In dealing with young patients one is often reminded of the lines:

"Heaven is not reached in a single bound,
We build the ladder by which we rise
From the lowly earth to the vaulted skies,
And mount it round by round."

For surely the ladder by which we mount to our desires for the welfare of children's teeth is slowly and painfully raised, and when youngsters present themselves with mouths that cast sad reflections upon parents who should be better informed, and when suasion brought to bear upon the little ones themselves and expostulations with parents meet with scant success, the rounds seem indeed far apart. However, when at last the seed falls upon good ground, and the half-formed habit of cleanliness becomes second nature with the child, then in truth do we mount from the lowly earth of our forebodings to the vaulted skies of fulfilled desire.

But why in this enlightened age, in which education is the watchword and ignorance a crime, should children be the victims of ignorance, and why should the parents not be compelled to incul-

cate into the receptive and growing mind of the child the moral necessity of dental cleanliness—for uncleanness in any form, whether it be in child or adult, influences and lowers the moral atmosphere. After the soft linen cloth has ceased to be used in the child's mouth, what an alarmingly small percentage of mothers sees that the child performs regularly and well the tooth-brush exercise.

Let us follow the calendar of septic conditions of the oral cavity—accumulations of tartar and probably green stain, decay of dentinal tissues and offensive breath. The pulp of a deciduous tooth being abnormally large in relation to the tooth itself, a comparatively small area of decay causes the little sufferer exquisite pain, and especially is this true during mastication. To save itself this pain the child shifts the food to another part of the mouth until all refuges fail, when the food is bolted, swallowed whole as it were, and the stomach, called upon to do double work, rebels. Digestive disorders occur, and no one knows the cause thereof.

After a while abscesses may appear, and aside from lowering the physical tone of the system, the pus organisms, principal among them being the streptococci and staphylococci—both active, pathogenic bacilli—are taken with the saliva and food into the digestive tract and on through the circulation, in either of which positions they may originate grave trouble. Furthermore, we are told by various authorities that in health the mouth is the abiding place of from 30 to 100 varieties of bacteria, and if this is the case under fairly hygienic conditions, what must there be in the presence of accumulated tartar, pus, decay and stumps of teeth. What a great increase there must be both in number and variety to emigrate from the oral cavity to distant and in many cases more susceptible parts of the human anatomy.

Also the pulp, either from constant exposure or by the medium of a dentist, becomes devitalized, absorption does not progress normally, and the permanent tooth finding an obstacle in its path takes the course of least resistance, and the result is irregularity of the dental arch.

All this train of evils—tartar, decay, entailing severe pain, digestive disorders arising from improper mastication, anemia, rare cases of septic poisoning, irregularity of the permanent teeth—all this un-

necessary suffering, are laid upon an innocent child by the neglect or ignorance of parent or guardian.

Do you think that the fault lies at our door, from our negligence in educating the parents in the proper knowledge of dental facts? Do you think if some able member of our profession were to prepare a little pamphlet for distribution among the clientele, setting forth the evils of oral uncleanness in childhood, and using a generous sprinkling of such bacteriological terms as *saccharomyces albicans*, *staphylococcus pyogenes aureus*, *bacterium gingivæ pyogenes*, and their fellows, that the adult race might become alarmed for themselves and their offspring and turn over a new leaf?

At college I used often to think that the lecturers were telling fairy tales when they spoke of the neglect and uncleanness of the mouths of some people. My first practical introduction, however, sufficed to dissipate all doubts. The patient was a tiny anemic little mortal, who looked as if results might have been better if the hard-earned money which had been foolishly expended in decking the small body with cotton ribbons and laces had been invested in wholesome food for both mother and child. When that small person's mouth was opened there appeared a vast sea of tartar and debris with tooth structure but little in evidence. Had not the ocular proof been before me I could not have believed that so small a mouth could contain such accumulations.

Another case was of a mother and six children. Prophylaxis was to them a closed book. Each mouth was worse than the other, and expostulation seemed vain. One day, however, the mother proudly announced, "I have bought a tooth-brush. I paid twenty-five cents for it, and *we all use it!*" Fancy one tooth-brush bearing the strain of seven owners. I reasoned, however, that one tooth-brush would assist somewhat among the seven in maintaining the cleanliness I had caused to come out of chaos, and as the family was already on the roll of the charity organization I feared that seven brushes at twenty-five cents each might mean temporary bankruptcy for the Society.

These college cases represent the children of the poor, but the same conditions are met with in all ranks of life. It becomes rather discouraging when children of cultured parents announce that they have stopped using a tooth-brush "because the bristles come out,"

or "It's so silly to scrub round in your mouth with a brush—what you eat ought to clean enough," and when parents themselves ask in a sort of sneering way, "What's the use of wasting so much trouble on the child's first teeth, others will come?" reason thinks of deserting.

Compare two children, one a sickly, fretful, anemic, little mortal, with big black-ringed eyes, taking no pleasure in itself or its surroundings, another a bonny little body, rosy-cheeked, laughing-eyed, and hale-fellow to the universe. Six times out of ten the former has an unclean mouth and decayed teeth, while the latter has his oral cavity in a fairly good condition.

How fine it would be if the parents could be taught, or better still if it could be instilled into the children themselves, that the teeth, including the first ones, are not responsible for themselves alone, but are accessories to the perfectly constructed mechanism which God has given us in our body, and with one part out of working order the beautiful whole is weakened. The perfect working together of the members of the human body is emblematic of the fellowship of the universe—in Emerson's words:

"Nor knowest thou what argument
Thy life to thy neighbor's creed has lent,
All are needed by each one,
Nothing is fair or good alone."

How can we teach the parents and children that "Nothing is fair or good alone"? Would it not be time well spent if more of the states would follow the lead of some of our Southern members of the Union, and through the medium of the public schools, suitable lectures and text-books teach the children themselves the incomparable value of their teeth?

As this paper is supposed to tend towards the melioration of the neglect of children's teeth, I should like also to put in a plea for more sympathy for the little tots. A child is like a rare exotic—tenderly cared for and nurtured each will open and reveal to us the golden heart within, but under harsh conditions—in an unsympathetic atmosphere, in unkindly hands—it will droop and shrink within itself. Nowhere is this characteristic more apparent with children than in the dental chair. The writer's aversion to personal dental operations is due to the fact that up to the age of six-

teen she was under the care of two dentists, who would each calmly go ahead and do what he had to do, without an atom of thought for the poor little shrinking being in the chair. Don't think that they were unlettered or brutal, for they were neither, both being cultured, educated men, of high standing in their profession, and both having rendered valuable services to their associates and successors, one in an educational, the other in an experimental line. The whole trouble was that they both failed to realize that the child lacks the mature reasoning power of the adult.

In my opinion children under a certain age consider every pain inflicted upon them as sheer cruelty on the part of the operator. If the little one is capable of understanding why he is hurt, by all means take him into your confidence, and once you have gained his trust the Rubicon is passed. Tact has more power than coercion, and the latter often brings to the front that element of stubbornness of which even the most cherubic infants have an unlimited supply.

It seems strange to me that there are no dentists who make the treatment of children a specialty, just as some physicians make a specialty of children's diseases. Picture books to look at while awaiting their turn put the mind in a more charitable condition, and a story of the dear old "once upon a time" will prevent many a little mouth from being drawn over your fingers like a tight rubber band. Anything to divert the child's mind. One little patient, who is of a very nervous temperament, acted so beautifully one day after I had explained the mechanism of the dental engine, cable and bur, that I immediately resolved at the first opportunity to read up on mechanics for the benefit of nervous little boys.

Above all, don't let a parent persuade you to do too much at a sitting in order "to have it over and done with." Let them come often. You won't lose by it. One little tot, now in my care, had like myself as a child been in the hands of a well-meaning but over-zealous worker, and became my staunch champion because I refused one day when her guardian insisted that five temporary teeth, tight in their sockets, while the successors were also presenting, should all come out at one sitting, although after the third (when I stopped for that day) the little arms and limbs were twitching spasmodically, and the little Spartan was shedding never a tear. The guardian and I had a war of words, but the other teeth

did not come out that day. The little girl thinks me not exactly a dentist, but a sort of hybrid, not knowing that my sympathy for her springs from that stern teacher, Experience.

Some of my hearers may be wondering how I can practice dentistry for children without hurting them. I don't, but if the operation will be painful I tell the child so, and let the little martyr see that I am sympathetic. Sympathy costs nothing, but smooths many a weary way.

When we come to the spoiled and pampered youngsters, who howl and kick, each probably has his own individual methods for dealing with them. In cases like this Solomon had my sincere approbation when he said, "Spare the rod and spoil the child." It is my hope, however, that not many of the aforesaid youngsters try to bite off the operator's fingers, as once happened with me.

Finally, in even so little a thing as the filling of a child's tooth the following beautiful lines may apply—"I expect to pass through this world but once. Anything therefore that I can do for my fellow-man, let me do it now; let me not neglect nor defer it, for I shall not pass this way again."

DISCUSSION. *Dr. M. L. Rhein*, New York: I am sure that I echo the sentiment of every one present in complimenting Dr. Bennett for the clinical pictures she has drawn so well for us of the tribulations of children in the dental office. I thoroughly agree with her, that if we are to be the saviors of the teeth of mankind we must begin with the very first one that is erupted, for it is at this time that the impression of prophylaxis must be marked sharply and strongly, and the essayist has struck the proper note along this line. She says it is necessary to reach the sympathetic chord of the little ones to gain their confidence. To work for very young children is a pleasure rather than a trial, and becomes difficult only when they have been frightened by the awful tales of dental work related to them by their brothers and sisters or nurses, and unfortunately even by their parents. The properly trained child is not difficult to handle, as he knows nothing of the pain and discomfort that are unfortunately allied with the practice of dentistry in later life, and we would have absolutely no difficulty with little children if we inculcated into their minds the value of dental prophylaxis. The lesson is much more easily learned at that age than at a later period in life, and if properly taught it is never forgotten.

Dr. W. G. Mason, Tampa, Fla.: This matter of a pamphlet to be furnished to parents, so that they may know how to care for their children's teeth, is an important matter and should be looked into carefully. I think it would be well for the Association to appoint a committee to draw up such a document.

THE FOUR YEARS COURSE—IS IT NECESSARY?

BY HENRY F. R. SNYDER, D.D.S., BALTIMORE. READ BEFORE THE
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While in this paper I do not presume to solve the problem of just what the scope of a thorough dental education should be, I nevertheless have some rather positive views as to the inadvisability of extending the dental course to cover a period of four years so long as dentistry is to be considered separate from and independent of the general medical profession. The thoughtful unbiased observer who has critically watched the wonderful evolution of dentistry during the last century now has the fact staring him in the face that the time is not far off when our beloved branch of learning must return unto the fold of the great general medical science as one of her greatest and most comprehensive specialties.

Already a large number of our best men are forsaking the laboratory to a great extent because of their inclination to a deeper and broader study of oral pathology and hygiene. These men are making remarkable progress in their knowledge of the histology of the mouth and jaws. They know the physiology of digestion well, and the slightest derangement of this preeminently important function they frequently detect and diagnose with ease because of their superior scrutiny of the oral tissues. They show a very creditable familiarity with materia medica and successfully apply drugs in their medical treatment of oral and dental disorders. They are self-possessed and efficient anesthetizers, for they understand the vital organs in their deranged as well as normal condition.

Here and there we even hear of a zealous member of this class of modern dentists going beyond tooth extraction as the limit of his surgical skill and performing with distinguished success some delicate operation upon a necrosed maxilla, a hypertrophied alveolar

ridge, an infected antrum or a cleft palate. However, in spite of all his medical and surgical skill he usually does not get from his patient an appreciation of his services commensurate with his ability. He has not the professional standing with the laity generally that he deserves because they cannot view him as a real doctor—he is only a dentist. To strengthen this erroneous impression the dentist, no matter how capable a stomatologist he may be, has nowhere a legal standing as a medical practitioner.

The four years' course, which really aims at a more complete divorcement of dentistry from medicine, by its patchwork medical instruction can only obstruct the progress of sound scientific research into stomatology. While the average physician displays a most deplorable disregard for a scientific consideration of oral conditions, the pursuit of investigation into diseased conditions of the mouth and teeth can be intelligently furthered only in its relation to a thorough knowledge of the whole body in health and disease. Therefore, if more instruction is needed to fit a dental student for the requirements of advancing science upon his skill, let him enter upon a full medical course at once and develop his dental and oral knowledge on a common footing with other medical specialists—only after a thorough education in general medicine.

But we have with us another class of able men who, in contradistinction to the above-mentioned men, largely cast aside the more scientific study of dentistry for a furtherance of artistic dental mechanics. These skillful artists can make artificial substitutes for the natural dental organs and overcome oral defects, by means of crowns, bridges, dentures, obturators, etc., which defy the criticisms of the most scrupulous as to their usefulness and close approach to the real. These skilled mechanics should not be considered doctors of dental surgery or doctors of anything else.

To sum up, a dentist should be a thoroughly educated physician and should practice his specialty on an equal professional footing, with the same opportunities for scientific study and research as are usually accorded other medical practitioners. A dental mechanic should be allowed, unhampered by college examinations and state board laws, to pursue his vocation of supplying to oral specialists, and to them only, such artificial contrivances and mechanical appliances as they may deem advisable to have made for their patients.

This solution of the problem of what dentistry should be will not

be immediately accepted. Therefore, until the two very different elements of our present dental profession can be brought to place themselves in the relative spheres they should occupy, let us patiently continue with the three years course of study. The advance which ought to be made in the dental curriculum at this time should be in the quality of instruction rather than in the length of the student's residence at the dental college.

DISCUSSION. *Dr. J. P. Gray*, Nashville: I cannot let a paper pass without some criticism when it takes the stand that *Dr. Snyder*'s does. It seems to me fallacious that some men should be called dental surgeons and others should not. Work in the medical branches of the profession and in the mechanical—in fact the whole of it is mechanical, operative as well as prosthetic—must go hand in hand. I bitterly fought the four year course, but since it has been started it should be given a fair trial. Members of the profession can help the colleges by encouraging the right sort of men to study dentistry and by urging the examining boards not to pass men who are undergraduates.

Dr. J. H. Crossland, Montgomery, Ala.: We have made some progress, although nothing like what we should have made, but by all means let us keep what we have gained if we never gain any more. Let us take no backward step. We have enough ignoramuses in the profession now—don't give us any more. There are entirely too many men in dentistry to-day who degrade it and who should never have been admitted to it. The colleges must be induced by some means to exclude those whose souls know nothing of the artistic or of the high and noble things of life. If a man has some education in ethics before leaving home, and receives some more after entering college—if he has an understanding of the eternal fitness of things—he will honor and not disgrace his profession. In my opinion the four year man will be just as good a dentist as the one who has studied three years or even two. It may be narrowing to study four years, but I must confess that I cannot see it.

Dr. Gray: Why don't you send us better men?

Dr. Crossland: We would if you would only send back some of the ignoramuses that come to you instead of graduating them. They are the fellows that are killing dentistry to-day. We want men who have some foundation to start on. As Emerson says, "No man can learn that which he has not preparation for learning." If there is

no prepared soil how can we sow the seeds of learning, of progress and of ethics? The destiny of dentistry to-day is in the hands of the colleges and the examining boards, and if the schools do not select instead of accepting these students dentistry must retrograde. The time has come when even business men are turning away from mercantile pursuits and broadening their minds. The man who enters a community with splendid attainments in dentistry but with no general culture cannot impress the public with the idea that dentistry is a learned profession.

Dr. J. Y. Crawford, Nashville: I don't think dental students should be better educated than anyone else, but believe they should have quite as much culture. I have insisted upon great competence, the same to be determined by some authoritative body, either the state boards or the faculties, and my idea has been to put restrictions upon institutions of learning so that they should be the highest tribunals to which a man's ability might be referred. I have also urged that the right to continue in practice should depend not only upon technical requirements, but on a consistent compliance with ethical conduct. This is an important point which has not sufficiently engaged our attention, and we should take some steps by which men who are incompetent could be debarred from practice. My idea was to have only three years and to magnify the teaching of our dental schools along fundamental branches, making more favorable arrangements with the other institutions whereby the dental student could perfect his minor branches. They sought to minimize the importance of the fundamental branches and to give more attention to technical work, so the colleges have gone to the four years course. It would be a retrograde movement to shorten the length of term because, first, it takes a man longer to qualify himself mentally, morally and physically for the successful practice of dental surgery than for any other profession, and second, the dentist encounters greater difficulties to intellectual progress after he begins practice because the element of manual labor enters into it so largely that he has not time to read and study. The average practitioner has to work day and night to earn \$1,500 a year, and from the first the dentist enters the tinpail brigade and is a laboring man.

VARIOUS REFORMS IN PROSTHODONTIA.

BY STEWART J. SPENCE, D.D.S., CHATTANOOGA, TENN. READ BEFORE
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As my object in presenting to you this paper is to set forth the claims of various reform methods in dental prosthesis rather than to offer something entirely new, I must crave pardon for saying some things which may seem to some of you like thrashing over old straw, and I offer as apology that these things are none too well known, and certainly not enough appreciated. I shall, however, present an idea or two which are, I think, original; but it remains to be seen whether or no you will say of my essay as was once said by a good preacher of another preacher's sermon, "He said some new things and some good things; but the good things were not new, and the new things were not good."

I will not detain you by lamentations over the decadence of plate work and the greater prominence given to other fields of dentistry. Suffice it to say, "These things ought ye to have done, and not to have left the other undone." While the need for plate work exists, which, despite all the advances made on other lines, is likely to be for some time yet, that which is done ought to be well done. Is it well done? For instance, is the prosthetic dentistry of the present day always sent forth correctly articulated? Shade of the mighty Bonwill, we blush to answer! It may be that the experience of my hearers has been more pleasant than mine in studying the occlusion of plates which have come into their hands during the last decade or two, but if not, perhaps the least said about it the better, for fear we awake from his last sleep the great apostle of articulation and bring down upon our heads his angry rebuke. Without going fully into the Bonwillian system of occlusion—or, as he preferred to call it, articulation—let us glance at its salient points. He taught that a proper intermeshing of the cusps and occlusion of the grinding surfaces would both aid stability of the plate and better serve the purpose of mastication. The lower jaw has four general movements, namely, (1) the vertical or up and down movement; (2 and 3) the two lateral movements, right and left, and (4) the protruding. Dr. Bonwill has shown that the teeth can be so adjusted on the plate that when the jaws are closed in making either of these

four movements, contact of the teeth may be retained in at least three opposite places, thus preventing the loosening of the plate on one side of the mouth while biting on the other, or of the posterior portions while occluding at the incisors.

There are articulating frames on the market—notably Bonwill's—which give with close approximation to correctness these four movements of the mandible, and these ought everywhere to be substituted for the old-style articulators, which give only the hinge or vertical movement. A fact of importance, however, for which these improved articulators make no provision, is that if the model is not placed in the frames at the same distance forward from the condyles of the articulators as in the patient, the bite cannot be afterwards opened or shut without deranging the occlusion. On this point Bonwill only directed that the median line at the incisal edges of the lower incisors should be about four inches from the condyles of the articulating frame, but Dr. G. B. Snow has introduced an instrument which will give the correct distance in each case, by employing which your essayist has found that the ordinary distance is rarely more than $3\frac{1}{2}$ inches. This instrument is of value for several reasons, but chiefly that unless the articulating bite has been so taken as to need neither opening nor closing after being transferred to the articulating frame, there will be, if such alteration is made—unless the model has by chance been placed at the correct distance from the condyles—a derangement of the occlusion whereby the molars will be found occluding too soon from a thus-opened bite, and in a thus-closed bite the reverse malocclusion will result, the incisors occluding too soon.

This subject of articulation naturally leads us on to our next subject—that of the need of reform in the dimensions of the grinding surfaces of porcelain teeth. For some inscrutable reason the manufacturers often make artificial sets of teeth having bicuspsids with only two-thirds, and molars with only one-half, the area of grinding surface found in nature, and then they leave out one large molar entirely, thus reducing the occlusal area to less than half that of Mother Nature. Are we wiser than she, that we do this? It is argued by the advocates of the small molar that its lesser surface allows it to be more penetrating than the large one, and that it therefore better comminutes food. Now, this argument might be of force if man were an entirely carnivorous animal, but as he is largely

a vegetable eater it is of little weight, for the reason that vegetables are, as a rule, easily enough comminuted if only they can be once brought between the upper and nether millstones of the oral mill, but are quite apt to elude their grasp and be swallowed uncrushed, and of course the smaller the teeth the more is this liable to occur. Beans, corn, grape seeds and pieces of radish, celery, onions, etc., not infrequently run the gauntlet of the entire alimentary canal and escape unbroken, acting as irritants as they go. On the other hand, flesh is usually digested in the stomach, even when swallowed in large pieces. The carnivora chew their food but little; the herbivora, much. Another argument against the small bicuspid and molar is, that their inferior size prevents correct articulation. With only two small molars, instead of three large ones, it is impossible to give that curve to the line of occlusal surface which, when the mandible is protruded in biting, brings the upper and lower molars in contact at the same time that the incisors come in contact; I say, this is impossible without making said curve so abrupt that the upper plate is liable to be pushed forward in biting, as by a tilted third lower molar. The small bicuspid is also unfavorable to good articulation when the lateral bite is made, because its inner cusp has passed out and beyond the outer cusp of the opposing tooth when they ought still to remain in contact.

The true artist in dental prosthesis could weep to see the defiance of nature exhibited by the manufacturers in giving to each tooth of the set the same unlikelike uniformity of shade. Centrals, laterals, cuspids, bicuspid and molars are all of one shade! Surely, it would be an easy matter to put a little more coloring matter into a cuspid or a molar. Then, again, those horrid spaces between the gum section teeth! Do they not in nature lean up against each other for mutual support like—to use Dr. J. D. White's figure—staves in a barrel? Continuous-gum work is ideal. It combines the excellence of the plain tooth—to-wit, its adaptability to any desired position—with the beauty of gum sections, minus the objectionable joints and spaced teeth of the latter. Unfortunately, however, the continuous-gum plate is too costly for most folks. After indulging in the luxury of supporting our royal family, the lords Vanderbilt, Rockefeller, Morgan et al, the free and enlightened, but sadly impoverished, American citizen finds himself with but little cash to spend on dentistry. Could we not, therefore, make a compromise between the high-priced

continuous-gum plate and the dull pink vulcanite plate, by adapting continuous porcelain gums to the vulcanite base, and sending our waxed-up dentures to the manufacturers to be returned later with porcelain gums substituted for the wax ones—at least as far back as the second bicuspid? Since a manufacturer can make an entire set of teeth for a dollar or two, surely he could, if he had enough of this work to do, supply us with these continuous gums at a moderate price.

Another needed reform is the larger use of aluminum instead of vulcanite for baseplates. This metal conducts thermal changes better than any other except silver, thus tending to lessen inflammation of the membrane and make hot and cold drinks more palatable than does vulcanite. Aluminum is strong, easily cleaned and very light. Vulcanite attaches to it as though each were made for the other. It is very easily swaged, being conformable to hard plaster dies by the use of screw pressure, instead of the hammer, in swaging. It is less liable to misfit than vulcanite, because of the shrinkage in cooling of the latter and the swelling of the model in vulcanizing, and its compression in flask-closing. If it breaks—as it is not very apt to do—it may readily be repaired with vulcanite.

On the subject of shrinkage of vulcanite plates more ought to be known, and especially on the means of its prevention. As the uncontrolled expansion of a 3-inch bar of vulcanite is nearly one-sixteenth of an inch at the first vulcanization, and increases with each additional vulcanization up to the fifth or sixth, by which time it reaches one-eighth inch, it follows that a plate of vulcanite changes shape very seriously in cooling. A very hard plaster will control successfully the contraction of the length and breadth of the plate, but that of its thickness does not come under the domain of the investment. I have found by experiment that a plate three-quarters inch thick over the ridge shrinks nearly one-fiftieth inch in thickness at first vulcanization. Now, as this contraction depresses the vulcanite that rests on the ridge, it acts on the fit of the plate as though it raised that of the palate, thus producing a rocking plate. Your essayist has found that the contraction of the thickness of a plate can be prevented by the use of the long-rooted teeth made for continuous-gum work, but as these are not always at hand, he employs in actual practice bars of serrated platinoid sunk vertically in the thick portions of the rubber. These can be easily held in place

if inserted when the case is about three-fourths packed, and they are better if bent into forms resembling carpet tacks or the letter U, placed points downwards. Another method is to drill three or four rows of pits in the model, one on the ridge and the others on the adjoining slopes. As these pits fill with rubber during flask-closing, they produce spurs of vulcanite which bind the model to the vulcanite during cooling. A second vulcanization, however, would work havoc with a plate made by this latter method, by permitting contraction, while one made with the internal serrated bars of platinoid would retain its form.

To guard against the contraction of vulcanite while permitting the expansion of plaster of Paris is like locking the back door and leaving the front one open. Indeed, it appears probable that many plates are rescued from the ruin to which plaster of Paris would consign them by means of this contraction of the vulcanite, one evil tending to counteract the other. (I refer now to contraction of the area of a plate, not of that of its thickness.) All plaster of Paris expands in setting, some brands more than others. A sufficient force will prevent this expansion, as a sufficient force will prevent the contraction of vulcanite, but as we use plaster of Paris in our art this force is not applied. In an impression taken in plaster of Paris the buccal flanges of the impression cup offer a partial resistance to this areal expansion; from this no benefit results, for the plaster in its effort to spread out its molecules, being restrained by these flanges, finds relief in bowing up at the palatal dome of the impression. In the model something similar takes place. Vertical expansion also to some extent works mischief with a model. If the model were equally thick in all places its vertical expansion would of course be equal over all, and so would effect no relative change, but in all models, especially those of high palates, the palatal thickness is much less than that of the ridge, and consequently vertical expansion is greater at the ridge. Thus, in every plaster of Paris model and impression there is distortion, due to both areal and vertical expansion, besides the warpage consisting in the bulging upwards of the palatal dome from the restraint of tray's flanges. Nor is this all.

Another yet larger expansion occurs in the vulcanizer, due to the action of steam on the plaster. This latter expansion of the model is not much lessened by the pressure of the rubber against it, because (as experiments show) the expansion of the model takes

place in the early stage of vulcanization, at which time the rubber is so soft from high heat as to offer but little resistance, and the plaster has not yet become soft. The expansion and contraction of plaster of Paris from change of temperature is so small that it may be ignored. Even if a model were to appreciably expand from heat when at 320° this would not affect the fit of the plate, because the shrinkage of the vulcanite in cooling causes it to conform to the shape of the model when it has cooled down to 130° , this being the point at which vulcanite contraction ceases. Still another evil lurks in the way to rob of its adaptation to the jaw a vulcanite plate which has been made upon a plaster of Paris model, namely, the compression of the model during flask closing. If any one doubts that so soft a substance as rubber will compress so hard a substance as plaster of Paris, let him reflect that rubber, like all compressible substances, becomes hard under pressure; then, if he still doubts, let him make the following simple and easy experiment: Having filled the lower section of a vulcanizing flask with plaster of Paris, soap its surface, and fill over it the upper section. When set, open, and place between these two plaster surfaces a lump of rubber, having previously coated said surfaces with tin foil to prevent adhesion of rubber to plaster, then close the flask in boiling water. On reopening the flask the experimenter will find that the rubber has sunk a bed for itself in the plaster, the depth of which can be seen by cutting in twain the disc of rubber. Coal oil, chloroform, benzoline, and other solvents of rubber will do away with this difficulty very thoroughly, but are open to the objections that they somewhat injure the quality of the rubber and greatly retard its vulcanization.

In closing let me present a method, original, I believe, of obtaining a correct closure of the jaws in taking the articulating impression. We know that the mandible is apt to protrude, and, in a less degree, move sideways. My method makes either of these mismovements more difficult to the patient and if correctly done it renders the protrusion impossible. It consists in the use of a piece of silk cord, about 2 feet long and 1-12 inch thick, so wound as to be devoid of stretch. This cord is passed around from the back of the neck, where it is tied in one fold, and then its ends are placed in the hands of the patient, who is directed to pull on them very forcibly at the time the bite is taken. Of course, it hurts a little, but it is intended that it shall do so, this also being the reason why

the cord is no thicker. The patient is made to sit upright, with the head thrown back, and usually the precaution is taken of making a preliminary closure, directing the patient to pull very strongly on the cord, before taking the decisive bite. If he is apparently not pulling very hard, insist on his doing so until it hurts. When satisfied that he is making an honest effort, proceed to take the bite. If the method you employ for doing this is that which is known as the "squash" or "mush" bite, the wax must, of course, be left out of the mouth during the preliminary closures. When this simple operation is thoroughly performed it renders impossible any protrusion of the mandible. I have given twenty-five years of study to the subject of the articulating impression, and was, I believe, the first to publish the method which has now become so well known through the True-bite plates; now, however, I give the palm to the little silk cord.

In reviewing the various reforms advocated in this paper, I am impressed, not altogether pleasantly, with the fact that they each involve more skill and effort than the methods they are meant to substitute. This ought not to deter us, for progress is almost always associated with an increase in complication, not in simplicity; the sewing-machine is more complicated than the hand-sewing needle, and the great Hoe printing press than that used by Benjamin Franklin. So with nearly every other line of human progress, and if we would advance as a profession we must be willing to meet with more and more difficult, complicated and scientific modes of operation.

THERAPEUTIC USE OF THE X-RAY IN THE ORAL CAVITY.

BY GEORGE F. EAMES, D.D.S., BOSTON. READ BEFORE THE SECTION ON STOMATOLOGY, AMERICAN MEDICAL ASSOCIATION, 1903.

The remarkably good results which have been recently achieved by means of the X-ray as a therapeutic agent are astonishing. The X-ray itself was accidentally discovered, as was also its chemical and therapeutic effect; its good results are therefore all the more surprising. The history of the discovery of the Röntgen ray, its wonderful penetrating power, and its use in photographing tissues and substances hidden from the ordinary sight are too well known to need further comment, but some attention to the nature of this wonderful electrical force, the means by which it is produced, and

the methods of its application for the purpose of obtaining a therapeutic result have a claim to recognition in connection with the subject under consideration.

The X-ray is known chiefly by the phenomenon which accompanies it, as no one has yet been able to define it. Many scientists have, however, advanced theories with the object of explaining its nature and character. Many agree that it is a form of transverse ethereal vibration, and formed in a series with sunlight and what is known as the Becquerel rays, the ethereal vibration being less in the case of ordinary light, more irregular in the Becquerel rays, and still more irregular in the X-rays.

Dr. H. P. Pratt, who has given this subject much attention, considers the X-ray as an electric current of a very high potential, which makes its circuit from the inner surface of the tube outward, perpendicularly to the surface, then radiates in straight lines until the potential falls, when the rays return to complete the circuit by the terminals. During the passage of the rays through the walls of the tube, through the atmosphere and into the body, it is accompanied by a liberation of oxygen from the body as well as from the surrounding atmosphere. One of the most important agents in the application of the X-rays is the Crookes tube, indeed, the greater part of the technique and much of the therapeutic effect depend upon the proper handling of the tubes. The tubes themselves are usually designated as hard and soft, or, what is the same thing, high and low vacuum tubes. The condition which determines whether a tube is hard or soft is the number of molecules of residual gas in the tube; this fixes the degree of the vacuum and, consequently, the condition of the tube as to whether it is hard or soft. An X-ray tube when acted upon by the electric current has been compared to a Leyden jar; it discharges in one direction, the outer surface of the tube becomes electro-positive, and the inner surface electro-negative. The usual method of producing the Röntgen ray by means of a Crookes tube consists in furnishing electricity to it by means of a static machine, or by the street current through a Ruhmkorff coil, the terminals of which are connected with a Crookes tube. [Dr. William B. Snow advises the static machine for exciting the electric current. This should have ten revolving plates thirty to thirty-four inches in diameter. While coils are often capable of exciting high tubes, it is perilous to both coil and tubes.]

The cathodal and anodal poles are connected, the molecules of residual gas within the tube furnishing the medium through which the current is established. When the current is thus passing, these molecules of gas within the tube are driven with great force against its inner surface, and the point of contact locates the origin of the Röntgen ray.

The following ideas regarding the production of the X-ray, by Dr. H. P. Pratt, are quite pertinent to our subject: "Every molecule of gas striking the inner surface of the tube causes one or more lines of magnetic force to be thrown out at right angles to the surface of the tube. The distance to which these lines of force are projected, or, in other words, the limit of the penetrating power of the ray, depends entirely upon the potential of the tube, and this in turn depends on the force of the impact of the individual molecules of residual gas. The higher the vacuum the less the number of molecules of residual gas in the tube; the greater the free path the higher the potential, the greater the penetrating power. All substances through which the X-rays pass form part of the X-ray circuit. The X-ray circuit is the same as any other electrical current. It has its return forming an endless chain of molecules, arranged in series. . . . The light which is emitted from the tubes is the result of decomposition of the molecules in the atmosphere around and inside the tube. This light is not the X-ray current; the X-ray force is purely electrical and invisible. . . . The softer the tube the greater are the number of lines of force thrown out and the stronger the current which increases decomposition, but the penetrating power is decreased. We are dependent entirely upon the number of lines of force projected from the tube to bring about ionization of the tissues. Ionization means changes in the elementary structures and increase in metabolism. . . . We need to have the greatest possible number of these lines of force within a given space for our best therapeutic work. This is possible only with a low or soft tube."

Having considered the nature and character of this electrical force, it becomes especially interesting to investigate the action which it has upon the various tissues of the body. Dr. Pratt suggests that "the magnetic force from the X-ray passes directly into the affected tissues. Electrolysis results, the chemical decomposition liberates oxygen, which unites with the free oxygen of the body and

makes ozone. Ozone will kill every bacterium the human body possesses. The X-ray does not destroy germ life by direct action any more than does the sun's rays; the bactericidal effect of both are due to ionization or electrolysis. Factors to be considered in X-raying are, 1, potential of the ray; 2, the resistance of the tissues to the ray; 3, the resulting intensity of the radiation. The first only is under control and is governed entirely by conditions in the tube, which are constantly varying, but which, by corresponding changes in the current energizing the tube, the spark-gap, etc., may be made approximately constant."

Experience in X-ray work has shown that for therapeutic effect a low or soft tube should be used, and the current increased according to the result which it is desired to obtain. The harder the tube the less the number of lines of force thrown out, and consequently the weaker the X-ray current and the less the decomposition, but the greater the penetrating power. While it is true that the X-ray improperly or incautiously applied will certainly burn the tissues, and that the burns are very painful and serious, it is nevertheless of rare occurrence with the careful and experienced operator, who, being mindful of the great difference in susceptibility of patients, adapts the current, the tube, the time of exposure, and the distance of the tube from the body to the conditions he finds in his patient. He will take other precautions, such as the interposition of a celluloid screen between the patient and the tube; this prevents the germs in the air between the patient and the tube from being driven into the body. From the foregoing we may summarize the following marked characteristics of the X-ray when applied to the human body. 1. The power of penetrating deeply into the tissues. 2. Its great germicidal power. 3. The power of destroying diseased tissues with the result of new tissue being formed.

These wonderful properties of the Röntgen ray, and many others of which we know, and probably others of which we do not know, have in actual practice worked marvellous results, as we have ourselves seen and as the published records have shown during the past year. It is reported that at least one hundred different diseases have yielded to the X-ray, the most notable perhaps being those coming under the head of malignant growths. These often occur in the mouth and should interest the dentist. The effect of the X-ray on malignant growths is summarized by Dr. Morton

as follows: 1. Relief from excruciating pain. 2. Reduction in size of new growths. 3. The establishment of the process of repair. 4. Removal of odor if present. 5. Cessation of discharge. 6. Softening and disintegration of lymphatic nodes. 7. Disappearance of lymphatic enlargements not submitted to treatment and often quite distant. 8. Removal of the cachetic color. 9. Improvement in the general health. 10. Cure, up to date, of a certain number of malignant growths.

The changes above enumerated are further described by Dr. M. F. Wheatland, who suggests that the X-ray vibrations acting on the cancer cells tend to stimulate many to maturity, at the same time breaking down the weaker ones, which are absorbed by the lymphatics and enter the circulation, producing the autointoxication so frequently observed, the number of cells reaching maturity and those undergoing destruction depending upon the intensity of the reaction established. At the same time changes take place in the small blood-vessels, their coats become thickened, narrowing their caliber, thereby reducing their blood-supply and aiding the return of the circulation to the normal.

Regarding the application of the X-ray to the mouth, the possibilities of its therapeutic effect may have a wide range. Already it has shown a marked influence over neuralgia and in the control of hemorrhage. In the various forms of benign and malignant growths, provided they can be reached by the X-ray, we may expect the same good results that have been attained in other parts of the body. It is reported, and it has been my experience also, that the beneficent results of the X-ray are not confined alone to the part to which application is made, but that remote parts of the body also come within the range of its influence; indeed, it is often remarked by the patients that their general condition is improved, and that they have a feeling of well-being after an application of the X-ray. The report that there is an increased discharge of uric acid during this treatment seems, from the examinations which I have made, to be true. It is my belief that the application of the Röntgen ray may be effectual in the treatment of that stubborn and obscure condition generally termed *pyorrhea alveolaris*, but of this I am not yet ready to report.

I am indebted to Dr. George R. Southwick of Boston for the privilege of reporting the following case: F. H. B., aged forty-five,

was troubled about six months ago with pain in the left side of the upper jaw, which was located in some of the teeth of that side. Some attention was given the teeth, and as the pain was not then constant or severe, further attention was delayed. The pain in the jaw continuing, the patient sought advice from his physician, who suggested that he was troubled with "canker," and provided him with an antiseptic wash; but the use of this failed to relieve his condition, and recently, on account of the severity of the pain and looseness of the teeth on the affected side, he sought the advice of a surgeon, who, when he saw the case, suspected malignant trouble and extracted the teeth on that side. He then sent the patient to Dr. Southwick, who kindly asked me to see the case and make suggestions as to an appliance for the mouth through which the X-ray might be applied, a positive diagnosis of epithelioma having previously been made. Finally, after several modifications a shield was constructed which properly protected the healthy tissues and allowed the ray to reach the diseased part. This consisted of sheet lead fourteen inches square, in the center of which was fitted and soldered a mouth-piece which projected into the mouth as far back as the tuberosity of the jaw, closed at the end, but on the side towards the affected part a piece was cut out in order to allow the ray to pass through the opening thus made, and into the diseased tissues. The condition of the part at the beginning of treatment showed some loss of tissue, white patches and inflammatory conditions, and a spreading to the cheek and to the center of the palatine vault. The treatment consisted in using a direct current of one hundred and ten volts from the street, reduced to one and a half ampères, approximately, before going to a twenty-inch coil of a Ruhmkorff pattern. From the terminals of this coil a soft Crookes tube of twenty centimeters was used, about twelve inches from the face for about nine minutes, the face and other parts being protected by the shield. The patient was treated in this way twice a week, and after two visits a marked improvement was shown. A further application of the X-ray was applied to the outside of the face with the object of reaching the facial nerve and controlling the neuralgia. This was effective in lessening the pain, and the good results in this direction have been progressive. The patient has at this writing received eight treatments, and the improvement in the mouth continues. All traces of the disease, however, have not yet been removed, and a prognosis must be withheld until a later date.

Digests.

DEVICE FOR EXTENSION CROWN. By Henry W. Gillett, D.M.D., New York. Read before the American Academy of Dental Sciences, Boston, February 3, 1904. I am moved to make these few remarks, which can scarcely be dignified by the name of paper, by the following train of circumstances. I received recently from Chicago a circular describing the conditions to which a so-called extension crown is applicable as an aid in securely anchoring lower partial plates, and offering a license for the use of the patented process for the sum of fifty dollars. The documents, which very carefully avoided any description of the device, I mailed to Dr. J. N. Crouse for his information, but the point of particular interest in them for me was the name extension crown, because for some years I have been using a device to which the name might apply. Asking one of our leading Chicago dentists about the device offered in the circular led to my also asking if the device I use is generally known and used, and if it had ever been described so as to safeguard it from patents. His verdict that it ought to be so described and your committee's request for a paper were coincident in time.

The kernel of the matter I want to put before you is the principle involved in the providing of a fixed point of support for certain classes of partial plates. I think most of us are ready to admit that fixed bridgework is less cleanly than removable pieces, but oftentimes the superior firmness it offers is so essential as to more than offset that defect, and lead to its use where we would prefer to advise partial plates. Removable bridges, strictly so classed, often call for so much destructive cutting as to rule them out. I think you will bear me out in the statement that many times these two points lead to the use of a plate, which the operator recognizes as less effective as a masticator than the bridge that might be used.

Dr. Bonwill showed us years ago one way of overcoming this difficulty when dealing with spaces having molars and bisucpids on either side. You remember and without doubt practise his valuable method of supplying a hook or lug to bear on the occlusal ends of adjoining teeth, and so provide rigid support for small pieces, and you are also familiar with Dr. Head's use of it in connection with

porcelain work. I recently saw a most successful application of the principle from Dr. Rhein's hands, the large rectangular lug in this case being let into the surface of a large gold filling in a molar so as to stand flush with the occlusal surface, and its generous proportions and parallel sides serving to steady the piece against torsional strain.

Modifications of the Bonwill lug are to me invaluable in a certain type of fixed bridge—but that is another story, and one which Dr. S. S. Stowell has told in detail. Minor objections to Dr. Bonwill's way of applying the lug sometimes present in cases of close bite, where convenient space for it cannot be arranged, or where the shape of occlusal surfaces and the angle at which the teeth stand are unsatisfactory.

The place where we need its help most, however, and where it entirely fails us, is in the cases where we desire and often must have rigid support if we are to attain even mediocre success in restoring the masticatory apparatus to real usefulness, namely, those cases where we have only the six front teeth for our anterior support, or often in the lower jaw for the sole support, and where the occlusion is such as to readily allow these teeth to yield and move forward if pressure is made against them. Even in the cases where the Bonwill lug is readily feasible, it seems to me a better application of the principle to place the point of support nearer the neck of the tooth—not that I discard entirely the Bonwill device, for it is often very useful. Placing the point of support at the neck of the tooth often results in a cleaner piece, because it presents less crevices and corners for debris lodgment. It renders possible the balancing of the strains thrown on the supporting tooth, and when the tooth utilized is one of the six anterior teeth it seems the only practicable point for such attachment.

My first use of the device grew out of my need for solving the problem presented by a case in which an upper partial rubber plate carrying molars, bicuspid, and one cuspid, and bearing heavy stress, kept presenting for repairs. It was observed that the plate was constantly driving up, and the upper front teeth, by a process familiar to all of you, were being forced forward rapidly. A molar on either side at the back gave opportunity for using Bonwill lugs, but until the left lateral (and later the right cuspid) broke off and needed crowning no stable support could be found at the front. When the lateral crown was made a modified Richmond provided the needed

help, and later with the same device on the cuspid stability was gained which revolutionized the conditions in the mouth. You have of course already grasped the point that this support was provided by a projection and strengthening of the top of the gold cap on the palatal side of the crowns, and the insertion in the rubber plate of a bit of gold plate to rest on this projection. Since that I do not remember to have used the principle in connection with rubber plates, but repeatedly I have found it so indispensable in partial gold plate work that I have extended its application to all cases where it is feasible to provide the support.

The advent of the so-called staple or Marshall crown has been very helpful in providing means for this support, and I do not hesitate to utilize a half-jacket of the staple class on the palatal surface of cuspids, or even centrals if it is needed. These half-crowns or jackets provide attachment for simple projections, hooks, or hooked

FIG. 1.



arms as needed, upon which the gold plate may rest. The stress is applied in the line in which the tooth is best able to bear stress, and without torsional or wrenching strain, as when a fixed bridge is used. What lateral strain there is can be easily balanced by contact with the artificial appliance near the occlusal surfaces. The teeth utilized for such support are still left in the best condition to withstand the extra strain put upon them.

In Fig. 1 I present at *a* the simple projection from the side of a molar gold crown; at *b* a hook sometimes useful when there is a possible spreading tendency of the appliance as it rests between the teeth on each side; at *c* a more extended hook which I have had occasion to use but once; and at *d* a projection from the band of a gold-banded porcelain crown. In Fig. 2 we have the left side and in Fig. 3 the right side of the upper jaw of a heavy, strong man, for whom it was necessary to shoe with 18-carat gold the upper six front teeth and open the bite. This of course called for rigid sup-

port against stress tending to drive the appliances towards the gum, and on the right side I did not dare put so long a span on a fixed bridge, and so expose the only remaining molar on that side to such severe stress. Simple lugs like *a* of Fig. 1 on the molar gold crowns (*f*) and on staple half-crowns (*e*) on the cuspids provided the desired rigid support for the small plates used. On the lower jaw the same principle of support was supplied, using the first bicuspid to support half-jackets, carrying the necessary projections. Lower bicuspid lend themselves readily to such a device, and in patients of the usual age needing them the pulps have generally become small enough to permit of the comparatively small amount of grinding needed on the lingual, mesial, distal, and occlusal surfaces for the

FIG. 2.

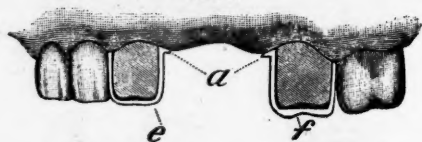
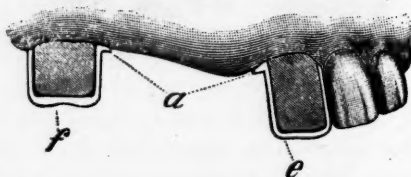


FIG. 3.



proper fitting of staple crowns. In these teeth I often prefer to get my grip on the tooth, with two 21-gauge iridio-platinum pins extending into dowel-holes in the occlusal end, rather than to cut the grooves in the sides for the so-called staple.

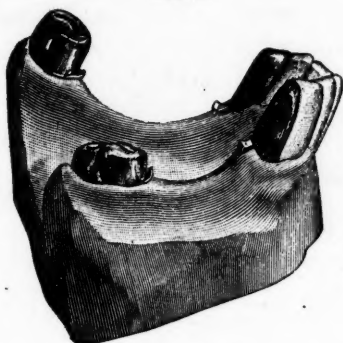
Figs. 4 and 5 show a case over which I have had one of the hardest struggles of my professional life, and in which I have gained what I consider a conspicuous degree of success. Previous plates before my first attempt had been worn mostly in the bureau drawer. The first one I made, with elaborate attention to perfection of detail, shared a similar fate. It had Bonwill lugs on the molars, and rested with broad contact against the slanting lingual surfaces of of the six unusually-thick-rooted lower front teeth. The first day or sometimes two days in the mouth it would work perfectly, and

then it would have to go on furlough till the bruised gum got well. Repeated relieving of the bearing at the sore points did no good. The ridge was large and firm, and because of its firmness bruised easily. Note the square effect of the cutting edges [which is not sufficiently pronounced in the cut], and you will realize that I had an edge-to-edge incisor bite to deal with, and the result of a day's mastication on the plate was to force the front teeth outward just a little, and that little allowed impingement of the plate upon the gum sufficient to cause trouble.

FIG. 4.



FIG. 5.



The problem was solved in this way. A gold crown was made for the left molar, and it and the gold crown already on the right one were provided with hooks like *b* of Fig. 1. The lower edge of the clasps (*g*) engaged these hooks so that they helped to resist any tendency of the plate to move forward. The lingual and approximal sides of the cuspids were provided with gold jackets of "staple" crowns, anchored by grooves cut into the sides of the teeth. The gold was cut away till it did not show at all on the labial aspect, and at the lower edge a hooked arm like *c* of Fig. 1 was soldered. This form was necessary because of the sharp upward slant of the gum

at that point, so that a plain lug on that angle would probably result in permitting the same forward movement of the teeth, and because the position of the teeth was such that it was found a lug set at any other feasible angle interfered with the insertion of the plate. A suitable recess was made in the plate to engage the hooked arm. These devices have solved the problem to the entire satisfaction of the patient and operator, and while the much remodeled plate is not as pretty to look at as at first, it does its whole duty three times a day.

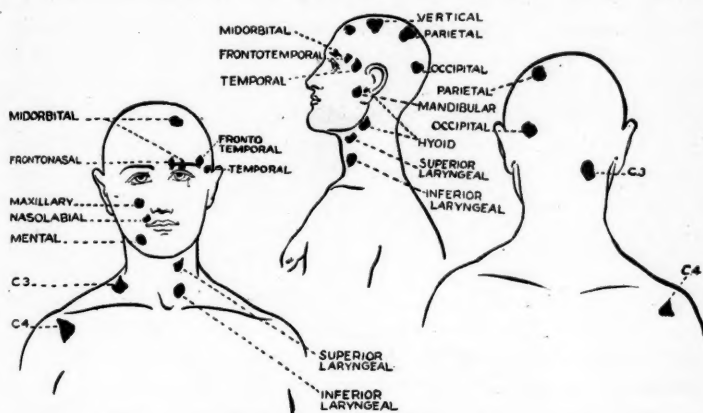
In making these devices, I usually find it best to make all crowns and lugs first and take impressions with the crowns in place. If some settling of the plate is desired the cast may be run without the crowns, and the resulting plaster duplicate of the crown may be built up at the point of support as much as is desired and the plate struck over it. In such a case as the lower plate just described it is better to work directly to the crowns themselves, striking up the plate free from contact with the crowns, and taking impression with it and the crowns in place, and make the needed additions when you have cast with all parts in place on it. To do this calls for the same absolute accuracy of detail as the highest grade of bridgework.—*International*.

FACIAL NEURALGIA. By H. L. Simmons, D.D.S., Chicago. Read before the Odontographic Society of Chicago, December, 1903. We all agree that dentistry is more than a trade, and if it is a learned profession, or a specialty of one, we should be willing to turn from the purely mechanical side and be interested in and have a scientific knowledge of all forms of disease pertaining to or affected by the organs of mastication. Of this class of diseases perhaps the one most often brought to our attention is facial neuralgia, otherwise called trigeminal neuralgia or neuralgia of the fifth nerve. An important reason why it should be an interesting subject to us is that its most obvious symptom is pain, and pain is the one thing which brings us most of our patients and the relief and prevention of which is one of our principal duties. Many physicians of modern methods refer all their neuralgias of the fifth nerve to a dental expert for examination, as trouble with the organs under his care is a direct cause in more than fifty per cent of cases.

The term neuralgia is applied to pain, usually paroxysmal in nature, which follows the course of a nerve or its branches. Facial

neuralgia may be divided into two distinct classes: First, the essential, neuralgia major or tic douloureux; second, the simple, reflex or neuralgia minor. This first form is the worst and most difficult to treat, as up to the present time the pathological lesion at the bottom of this disease has not been discovered. Almost invariably we find that it has been mistaken in the early stages for simple neuralgia, as very commonly it begins in the upper or lower jaw in the region of one of the teeth—but never, in my experience, in the tooth itself.

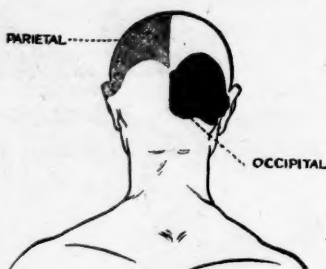
The history of one of these cases is somewhat as follows: A man or woman—more often a woman—between thirty-five and sixty



years of age, apparently in fair health, is suddenly attacked with pain in the course of one of the branches of the fifth nerve. The pain is continuous for some hours or days. The teeth receive attention, but no relief is experienced, or perhaps a tooth is extracted and the pain ceases for an interval, then recurs, and at last no day passes without an attack of greater or less severity, varying in duration. Gradually the attacks increase until consecutive work is impossible. The first attack is, so far as the patient can tell, without apparent cause, but later attacks may be brought on by changes in weather, constipation, and numerous mental conditions such as shock, business worry, etc. Sooner or later the pain spreads to other branches in the same side of the face. Throughout many hours of the day the patient is racked by paroxysms of pain at

regular intervals, lasting from a few seconds to many minutes. Sleep, except under drugs, becomes impossible; the patient dare not eat, talk nor smile for fear of starting a paroxysm. Life becomes utterly unbearable and is often ended by suicide. The character of the pain is generally described as that which would be produced were a red hot electric wire plunged into the face, the current following the whole nerve, and at all times the pain seems to be below the skin. During the attack a breath of wind, the slightest touch of beard or hair, drinking or even swallowing saliva, will increase its severity. The affected side has a more or less permanent red flush; hair or beard may change color or fall out.

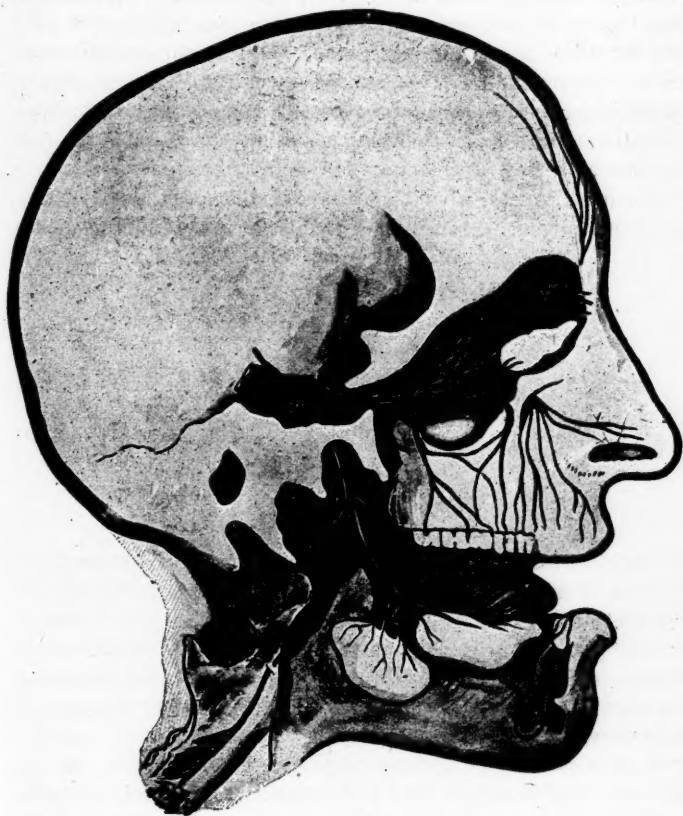
Prognosis.—Prognosis of tic douloureux is very unfavorable. Medical means cure but a limited number of cases, and while sur-



gical measures bring relief, unfortunately in very few cases is it permanent, though a respectable minority of cases is cured.

Treatment.—The proper treatment of this form of facial neuralgia includes a thorough treatment of the patient. All constitutional dyscrasia must be taken into consideration and treated hygienically and medicinally; indeed, attention to them is of far more importance than treatment of the pain itself. Every possible source of irritation must be removed. The constitutional condition of the patient must be thoroughly studied, and the diet and general habits directed accordingly. A quiet life in a warm, sunny climate seems to benefit many of these patients, but does not cure cases which have already become severe. No drug is a specific, but carefully selected remedies often relieve and help. Of the homeopathic remedies the most useful are aconite, belladonna, arsenicum and gelsemium, given according to their several indications. Palliative medicinal treatment must be used, but I must protest in the strong-

est terms against the use of morphin and cocain internally, as they can not be curative and the danger of establishing a habit is very great. The drugs of the coal tar group have a palliative effect, even in the later stages, and large doses of quinin often relieve.

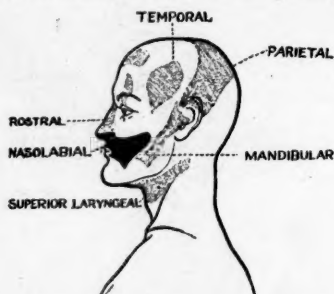


Local Measures.—Counter-irritation over painful spots or the actual cautery is of some value; equal parts of camphor and chloral rubbed up together, and menthol in oil are also useful. Freezing with ethyl chlorid spray of the parts affected will often give marked relief. The skin of the face should be protected with a thin coat of grease, the eye carefully guarded, and the spray should never be

directed against any one spot longer than three or four seconds. Galvanic electricity is sometimes curative but it rarely affords more than temporary relief.

All remedies failing, there are several surgical measures open to trial, such as nerve-stretching, nerve-resection, and the excision of the Gasserian ganglion, also ligation of the common carotid. The first two often afford relief for many months, but ultimately the pain recurs in nearly every case. The removal of the ganglion is a dangerous operation, but by the newest methods few of the cases are fatal, and it is considered by the best authorities to be the only sure means of cure for this most terrible of all diseases.

NEURALGIA MINOR.—I shall now take up the reflex form, which is more important for us because the cure lies principally in our hands.



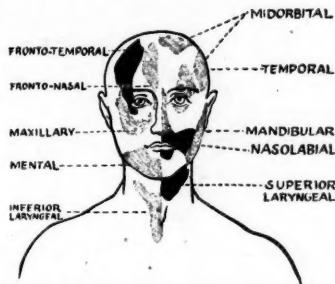
Neuralgia minor or simple reflex neuralgia is the form associated with and, in fact, caused by disease in some organ, and the pain may be entirely reflex or may accompany pain in the diseased organ, as, for example, pain in some portion of the face of a patient who at the same time is suffering with an aching tooth, or the pain in the face may be present without any known disturbance in a tooth or other organ of the head.

Prognosis.—This form of neuralgia can be cured if we can find the cause, and to help in this is the principal object of this paper.

Etiology.—Among the numerous causes dental troubles take first place, and this makes this subject a very important one for us. Neuralgia minor may also be secondary to changes and diseases of the eye and the ear, of the tongue, of the nose, and further it may be secondary to diseases of the organs within the thorax and abdomen; likewise to general diseases such as anemia, diabetes, malaria, rheumatism, hysteria and other mental states. The discov-

ery of the primary diseased organ is the first step toward performing a complete cure, and the greatest help in making this difficult discovery is the location of the portion of the face in which the pain is most severe and where the sensitiveness of the skin is most apparent. To demonstrate this tenderness in the skin pick up the tissues lightly between the finger and the thumb, and as soon as the tender spot on the face is reached the patient will complain that *there* he feels sore, tender or bruised. Sometimes it may be determined more accurately by light pressure with the blunt end of a common pin, and the patient will complain when you reach the most sensitive spot that he is being pricked with the pin or that the head of the pin touches a sore place.

To make this clear I have had charts prepared, and the different



portions of the face divided into areas, also the maximum point of each area, and a table made to correspond to the areas as named in the chart. This table and these charts are taken from Thomas Clifford Albutt's "System of Medicine," and by comparison with numerous other authors I have come to believe it the most accurate assistance to diagnosis of the causes of neuralgia minor so far devised. He explains the preparation of these charts in the following paragraph: "When an organ, such as the eye or one of the teeth, is affected, pain is situated not only in the organ itself, but is referred to parts at a distance in the scalp or face. Such referred pains when of sufficient severity and duration are accompanied by areas of superficial tenderness. These areas are supposed to represent the region of the nerves for pain, heat and cold to the head. The charts are given to show their character and distribution. When the tenderness is not very severe these areas may be present. These maximum points are of practical importance because they are

only in part; certain spots in each area are then found to become tender sooner and to remain so longer than any other part of the area. These maximum points are of practical importance because they are the spots to which the patient refers his pain whether the pain be accompanied by superficial tenderness or not, and these maximum points I have shown in this chart: (See page 983).

TEETH.

<i>Upper Jaw.</i>		<i>Lower Jaw.</i>	
Incisors	Fronto-nasal	Incisors	Mental
Cuspid	Naso-labial	Cuspid	Mental
1st Bicuspid	Naso-labial	1st Bicuspid	Mental
2d Bicuspid	Temporal or Maxillary	2d Bicuspid	Doubtful
1st Molar	Maxillary	1st Molar	Hyoid
2d Molar	Mandibular	2d Molar	Hyoid
3d Molar	Mandibular	3d Molar	Superior, Laryngeal or Hyoid

EYES.

Errors of refraction.....Mid-orbital, Temporal and Vertical

EAR.

Hyoid region principally.....Sometimes Vertical and Temporal.

TONGUE.

Anterior portion	Mental	Dorsum	Occipital
Lateral portion	Hyoid	Tonsils	Hyoid

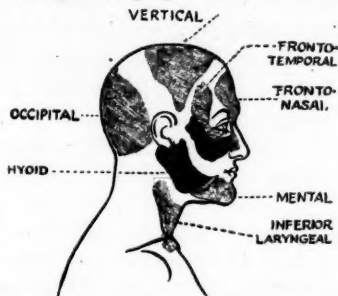
NOSE.

Fronto-nasal and Mid-orbital.

Let us take up first neuralgia minor secondary to diseases of the teeth, and in doing this we must think of all these diseases and see what reflex pains they produce. 1st—Simple caries, without exposure of the pulp, usually gives one a local pain in the teeth. The pain may dart and shoot, but this darting and shooting is practically confined to the tooth, but as soon as the pulp is exposed we find the pain starting in the tooth and then darting to different portions of the head, face, ear or neck. Eating or taking heat or cold into the mouth stimulates the exposed pulp, increases the pain or starts a paroxysm. By testing by the method given before more or less tenderness of the skin may be found corresponding to the areas given in the charts, and when such a tender area on the face is reached the patient commonly complains that a touch within these limits seems to make the pain in the tooth worse—but this tenderness does not arise until neuralgia has lasted several hours. For instance, the maximum point in the hyoid area (see chart) is the ear, and this area, according to our table, is particularly associated with the molars of the lower jaw, so we may reason that a patient

complaining of neuralgic pain in the ear may be suffering from irritation caused by disease of one of these molars—although they give no appearance of it.

Within the last few weeks a patient was under my care whose case illustrates this point very well. She complained of neuralgia in the left side of the face. The pain had been more or less constant for three months, and she dated the start of the pain one week after the extraction of the upper first bicuspid. This fact caught my attention and I at once began to hunt for nerve implication in the scar tissue where the tooth had been extracted, but on getting a further history of the case and testing for the sensitive areas I found the hyoid area to be distinctly involved, and remembering the table I at once began to examine the lower left molars and very soon found distinct signs of pulp irritation in the lower left third



molar. On opening the tooth I found the pulp partially dead, and when I had treated it and entirely removed the pulp the neuralgia was cured, indeed, from the very first treatment the patient noticed marked lessening of the pain both in frequency and intensity.

We are particularly apt to overlook pulp-stones or other hidden causes for irritation of the pulp, and we must not neglect any possible cause. There may be no toothache, but the constant recurrence of the neuralgic pain with the superficial tenderness in some definite area of the face should direct our attention to certain teeth, among which we shall probably find the affected one. While the pulp is living and inflamed these reflex pains, accompanied by more or less superficial tenderness over these segmental areas, are almost certain to make their appearance at some time or other, but when the pulp is dead and pericementitis or abscess forms the pain is usually local and confined to the tissues about the teeth. If, however, neuralgia

appears it differs entirely from that produced by inflammation of the pulp and is more like the pain of *tic douloureux*, and a superficial tenderness of the various areas is rare. Instead, the pain follows the distribution of the peripheral branches of the fifth nerve. Periosteitis or alveolar abscess produces a reflex pain soon becoming neuralgic either by involving the branches of the nerve in the inflamed tissue, in which case the pain radiates up the nerve, or by causing pressure upon the trunk of the nerves of the teeth, and then the pain follows the peripheral distribution of the affected nerve, and is felt in all the teeth supplied by it.

Now let us take up neuralgia secondary to diseases of the eye. Errors of refraction often give rise to pain of neuralgic character, as do numerous diseases involving the eye or optic nerve, but in almost all these diseases the pain and tenderness are over the eyes—the mid-orbital region of the forehead; but if severe they tend to spread both forward to the middle line of the forehead and backward into the temporal fossa and upon the vertex. Disease of the eye sometimes produces tenderness in the teeth, but it is shown to be a reflex tenderness when there is a daily change in the position and number of the tender teeth coincident with changes in the condition of the eye.

Third in this list we shall consider neuralgia secondary to ear disease. Only when the middle ear is affected is pain reflex and accompanied by superficial tenderness. For all practical purposes the sensitiveness of the hyoid area would indicate ear trouble, and when the sensitiveness extends to the vertical and temporal areas, as it sometimes does, it is in cases where the tension is so great in the middle ear that the existence of ear trouble can not be overlooked.

Malignant disease of the tongue may cause reflex pain of a neuralgic character in the ear or over the back of the head. If the disease involves the anterior portion of the tongue the reflex pain will be over the mental foramen; if the lateral portion of the tongue the pain will be in the ear and ramus of the lower jaw of the side affected. If the posterior portion of the tongue is affected the pain takes the form of occipital neuralgia.

Nasal affections are rarely intense enough to give rise to pain which may be called neuralgia, but when it does occur this reflex pain appears over the fronto-nasal and mid-orbital areas of the

forehead and is quite easily distinguished from other reflex pains.

As I have said before, there are many other diseases to which neuralgia is secondary, but discussion of them is beyond the scope of this paper.

Treatment.—Find the organ from which the pain arises and treat the condition found there and you will relieve and cure your patient. General constitutional treatment, palliatives, and many of the measures which I gave for the treatment of tic douloureux will help in the cure, but never forget that the first and foremost rule is—find the cause.—*Review.*

TECHNIQUE OF CAVITY PREPARATION FOR PORCELAIN INLAYS IN THE SIX ANTERIOR TEETH. By Ernest J. Eisen, D.D.S., and Dr. Wm. H. Cudworth, Milwaukee. In the February issue of the *Cosmos* (DIGEST, May, 1904, p. 584), we presented a paper upon "Cavity Preparation for Porcelain Inlays in the Six Anterior Teeth," as to which we feel that its empirical nature left many things unexplained, several points of detail having to be omitted. A minute study of the subject and its presentation in a more exhaustive form will facilitate a closer observance of the characteristics of cavity formation of that description and the principles governing its construction.

The feature which has most retarded the advance of porcelain to its rightful position as a filling material has been the employment of zinc oxyphosphate as the agent for retention. Recognizing this fact, we must consider ways whereby we may overcome the weak qualities of cement, or this being found impossible, endeavor to control them. Cement, in fact, besides its inability to meet expectations entirely as the agent for retention, yields to some action which makes permanent sealing of all margins impossible.

Whether the dissolution of cement around the margins of porcelain inlays be due to mechanical or chemical action we are not ready to say with any degree of certainty. Many share the belief that the chief cause of dissolution is to be found in mechanical action. The apparent check to its progressive dissolution, if caused by chemical means, may be accounted for through capillary action. We may conclude, then, that dissolution is accomplished by chemical and mechanical means until capillary action forbids entrance of the fluids of the mouth in the space between inlay and margins. Inlays not

including the incisal angle may be considered immune from any action other than a chemical one.

Our attention has often been called to a dissolution or disintegration of the cement at the incisal margin. It probably in no way impairs the efficacy of the filling, but the presence of an unfilled space is likely to cause some uneasiness to both operator and patient. This space, and any ineffectual sealing of a cavity, must receive attention, and the restoration of the incisal angle calls for study as to how best to overcome this distressing feature. The question here arises where to check dissolution, for we should not allow the marginal space to become involved to some indefinite point where disintegration ceases.

Adaptation of the walls of the inlay to the margins of the cavity is a feature in which we strive to attain the acme of artistic results. Men who recommend spherical cavities claim the adaptation of the inlay to be one of their great advantages, but for those not deluded by false ideas and unsound theories this is not the only thing to be accomplished. With angular cavities we are not depending upon a theory such as "crystallization under pressure," but we come in contact with laws, and upon these base our cavity construction, and when we consider the question of inlays from this view we are nearer a solution of the problem. The law in regard to adaptation is that of the inclined plane.

"An inclined plane is a surface inclined so as to make an oblique angle with the horizon. When a body is placed on an inclined plane the gravity pull is resolved into two component forces. One of these acts perpendicularly to the plane, producing pressure upon it, the other component tending to produce motion down the plane. To resist this mentioned tendency, and to hold the body in its position, a force may be applied in three ways: (1) In a direction parallel to the length of the plane. (2) In a direction parallel to the base of the plane, *i. e.*, horizontal. (3) In a direction parallel to neither the length nor the base. The mechanical advantage to be derived from the use of the inclined plane varies with the three conditions above given."

This law finds its first application in the construction of a labial cavity. Except where such a cavity extends to some degree below the gingival margin its preparation is simple, and in most cases may be quickly accomplished. An inverted cone bur of proper diameter

will give us a result for retention far superior to that which can be obtained by the use of a rose or other round-surface bur. A cavity of this nature may be made slightly larger at the orifice than at the base without impairing the adaptation of the inlay. The flaring of the walls must be gradual from the base, with but the smallest possible degree of difference in the diameter of the base and orifice. (Fig. 1.) It becomes apparent that the more firmly the inlay is driven into place the closer does it apply itself to the lateral walls.

Simple Approximal Cavity—Labial Aspect.—The preparation of a simple approximal cavity, labial aspect, is governed by very simple rules. The gingival wall should first be formed at right angles to the long axis of the tooth. The pulpal wall should be cut parallel to the long axis, and slightly obtuse to the lingual wall; the lingual wall is to be flat, and the incisal wall obtuse to the lingual. The inlay when adapted to this cavity will go to place in the direction of

FIG. 1.



FIG. 2.



FIG. 3.



line A, Fig. 2. The space originally occupied by the matrix at B will be taken up, and that occupied at C will be obliterated by the inlay's course down the inclined plane. The inlay accommodates itself to all surfaces of the cavity, and no line of demarcation is perceptible.

Simple Approximal Cavity—Lingual Aspect.—A simple approximal cavity with lingual aspect is shaped upon similar lines. The pulpal wall should be cut at right angles to the gingival and incisal walls, the incisal wall at an obtuse angle to the labial. The only difference in a cavity from the lingual aspect is the cutting away of more or less of the thin edge of the labial plate. This is done to prevent the formation of a thin line of enamel, resulting from the oval surface of the labial portion of the tooth. (Fig. 3.)

In taking up the technique of cavity preparation for cases including the incisal angle the determining feature in all cases should be a study of the occlusion. No definite lines for any incisal cavity should be decided upon until this has been accurately determined, and the direction noted in which force is applied through mastication. Our efforts in reference to this should include the study of the jaws in

repose, in positive occlusion, and in false occlusion by having the incisors brought together at their edges. It is also very important to determine whether the normal occlusion is high or low on the lingual plate of the upper incisors.

Approximo-Incisal Cavities.—When confronted with a cavity of this class several features are to be taken into account in order that an inlay may be satisfactory regarding its adaptability to all walls, and to nicely counteract the force which it must withstand. The difficulty of overcoming the space between inlay and margin at the incisal edge is here met. Adaptation may be made so accurate as to leave no perceptible line at the incisal angle of cavities planned as in Figs. 4 and 5.

In our estimation there is little choice, as far as the advantages of construction go, between the cavity as shown in Figs. 4 and 5. In some cases, where extensive separation is impossible and where the forces of mastication are in the direction of the long axis of the tooth, the cavity as shown in Fig. 5 is preferable. For this cavity the labial wall is to receive treatment in the same manner as other approximo-incisal cavities, which is shown later. The pulpal wall should be parallel to the long axis of the tooth, the gingival wall at right angles to the pulpal wall, and the lingual parallel to the inner surface of the labial plate.

For a cavity as shown in Fig. 4 the gingival wall is to be flat and at right angles to the long axis of the tooth. This may be formed with a right-angle fissure bur. The pulpal wall is formed by drawing the bur from the gingival margin incisally to within a sixteenth of an inch, or to such a degree as is warranted, of the incisal ridge. The incisal wall is to be cut at an obtuse angle, incisally, to the inner surface of the labial plate. The inner surface of the labial wall of enamel is cut at a right angle to the pulpal wall, through the action of the bur in its downward course toward the incisal ridge.

Where occlusion is favorable, and the incisal edge permits of such treatment, a step may be cut for the express purpose of counteracting mechanical dissolution. The step is confined entirely to the lingual wall, not being perceptible on the labial plate, and is intended to overcome that dissolution at the incisal edge which might otherwise mar the perfectness of an approximo-incisal restoration.

The preparation of the labial wall is identical in all cases where the incisal angle is involved, and the adaptation of the inlay to the cavity

is directly dependent upon the care with which this wall is designed. In order that there may be perfect adaptation in all parts of the cavity the labial wall must be devoid of any bevel and be parallel with the long axis of the tooth. With a chisel the gingival two-thirds should then be beveled gingivally and inwardly, and form an angle at the gingival margin. This accomplished, we have a cavity to which an inlay will adapt itself perfectly and overcome at all parts the space occupied by the matrix. Constructed in this way we accommodate the inlay to those principles of the inclined plane which make it perfect from a mechanical standpoint.

Compound Approximo-Incisal Cavity.—When we come to consider the preparation of a compound approximo-incisal cavity the one difficulty encountered is how to overcome the shrinkage of the porcelain, and also the adjustment of the walls of the inlay to the surfaces of the cavity when the matrix is removed. In a large compound

FIG. 4.



FIG. 5.



filling the shrinkage in the porcelain is unequal gingivo-incisally and mesio-distally. As to how this shrinkage may be entirely done away with we do not venture a suggestion, but we may so construct the cavity as to cause the shrinkage to assert itself entirely at the gingival margin, and allow the non-compensation of matrix to show at this place.

In a compound-approximal cavity, where three distinct margins are visible upon the labial wall, it is most important that the space caused by shrinkage and non-compensation when the matrix is removed should be regulated so as to be placed at the least vulnerable point, which, for a porcelain inlay, is the gingival margin. We therefore construct the cavity so as to have the inlay go into position with an axial lateral incline. (Fig. 7.) The labial wall is prepared similarly to that of the approximo-incisal cavity, *i. e.*, the gingival two-thirds should be beveled inwardly. The pulpal wall is to be parallel to the long axis of the tooth, the step a right angle to the pulpal wall, and the labial parallel to the pulpal wall. The inner surface of the two labial plates should be at right angles with their antagonistic sur-

faces. The lingual wall is cut away except at the linguo-gingival angle, its inner surface parallel with the inner surface of the labial plate.

Approximal Cavities in Cuspids.—Approximal cavities in cuspids require that the lingual, pulpal, and gingival walls be at right angles to each other, but that the labial wall have a bevel from within outward of at least 5° , so that when the inlay is inserted it slides down the inclined plane which this wall forms, and is forced firmly into the linguo-gingival angle.

Treatment of Cavities in the Lower Teeth.—The treatment of cavities in the lower teeth presents some difficulties. In a measure the construction of these cavities calls for the consideration of the forces of mastication, which are directly opposite to those encountered in the upper teeth. The construction of cavities not including the incisal angle may be identical, relatively, with those in the upper

FIG. 6.



FIG. 7.



FIG. 8



teeth. Where the incisal angles of lower teeth are involved our treatment, however, should be reversed, so as to make the lingual wall the recipient of the force applied labially. It will be seen that by the construction of such cavities the dissolution of cement is controlled in a great degree, in that it divides the space where this occurs, obviating a direct line at the incisal edge, and so impeding dissolution as to make it of comparatively little importance.

The Simple Principle Involved.—If the above description of the preparation of the various cavities has been carefully followed it will be seen that the prime factors in causing the inlay to adapt itself firmly and closely to all the walls depend entirely on the beveling of certain surfaces in a definite manner. The action of this bevel is that of an inclined plane forcing the inlay to travel in a definite direction, *i. e.*, that direction which would approximate the walls of the inlay to the walls of the cavity. When it is once understood that the cavity walls are constructed on definite mechanical lines, and that the force which causes the inlay to adjust itself to the cavity, and to be held there, is governed by the simple laws of the inclined plane,

no great difficulty will be met with in adapting porcelain inlays to any cavity in the six anterior teeth.—*Cosmos*.

AN IDEAL IN PATHOLOGY. By D. R. Stubblefield, D.D.S., Nashville. Read before the Institute of Dental Pedagogics, at Buffalo, December, 1903. Teachers in dental schools are not supposed to deal much with ideals. This is mostly due to the fact that the dominant idea with the average dental student is to learn to *do* something. It is very easy to get his attention when there is "something doing," for his very fingers itch to get into the actual work. He is only happy and contented when he is blundering along in some attempt to do what he has seen done or only heard of, without a clear mind-picture of the end aimed at. He may succeed by dint of luck or happy accident, but skill is attained only by him who first gets a clearly defined mind-picture and from that ideal works to a certain end. In other words, ideals must exist before definite results can be expected, whether in one or another field of human enterprise. Therefore, we would enter here a plea for better, clearer, more definite ideals as the best, even the most necessary, foundation for all our work. We do not think this end can be attained by a happy-go-lucky, slipshod method, but it should be the intelligent aim of the teacher to get himself so saturated with the highest conception of his work that he will not be able to express himself without voicing his ideal to his classes. Set on fire by this ideal, he becomes the ideal teacher. All the world's great reformers have been ablaze with an ideal which could not be shut up within them, even if they were to be martyred for the utterance. They were the men with messages to deliver and they left an ineradicable impression upon their day and generation. While this is true, the world is not altogether pleased with the idealist, or, as they say it, a "dreamer of dreams." He is looked upon as unsafe, as one who dreams while others work to do things. There is some show of reason for this, because all ideals are not necessarily correct any more than all ideas are, and also because all minds do not form correct conclusions though they make mental pictures. We would make no claim that mind pictures are any more perfect of necessity than the material pictures from the artist's brush, but we claim that the first and only correct basis for a practical affair is a perfect ideal standing out clearly in the mind before the first step is made in its

practical achievement. Sir Christopher Wren and all other great architects built in mind their great cathedrals before the foundations were begun. And so it must ever be, as will be seen upon reflection. The ideal which we shall try to place before you is undoubtedly open to all the limitations indicated above, but the principle enunciated we claim to be almost if not quite axiomatic. Our ideal is only the result of an effort to get a simple view of the subject which we might hope to impress upon the students more easily.

Pathology. Pathology, simply stated, is only a discussion of disease. Some impairment or interference with the nutrition of a tissue or an organ has been produced and the effect is discussed from all sides. Some effects are open, easy to read, and their causes are equally easy to see and understand; but others are obscure and indefinite both as to nature and results, as well as causation. Along this line we must all feel that much remains to be done, for we may not rest securely in the knowledge of the present. The philanthropic workers in the laboratories and in the wide field of the world must be content largely in the consciousness of having benefited their fellows, which is the only capital that can be realized upon in the hereafter, as we are credibly informed.

These interferences with the normal may differ very naturally as their causes differ, arising severally as they do from (a) Malnutrition, (b) Unsanitary surroundings and (c) Outside interferences. Another cause for variation is the difference of structure in which the cause is at work, rendering all efforts at definite symptomatology almost futile. Indeed, all the thousand differentiations in nature, as age, sex, climate and so forth, add their assistance to those above to make confusion worse confounded for the diagnostician. To get some simple yet comprehensive grasp upon this complex condition is the object of this discussion. So long has this subject of pathology been under the ban of general ignorance that the idea has been almost accepted that it cannot be understood by any except those who give themselves wholly to it. The student minds seem to get this popular prejudice first of all and they assume a mental attitude of helplessness toward it. This is not as it should be, for there is no "ology" so abstruse that its essentials cannot be rendered plain if we go about it in a plain, common-sense way. At the same time we confess very freely that it was not long ago when it seemed impossible to get such a grasp on this subject which had not been thus

simply impressed upon us, and it seemed almost unthinkable to get on intimate terms with it. An old friend used to say that when he was growing up they studied at college "Losophy, Gosophy and Phleanikislunk and nothing else, which put the college men above and beyond ordinary mortals." This always comes to mind when we find this idea of pathology being beyond the ordinary man still alive, though possibly unacknowledged as such. But it can be understood if we take its simplest, initial principle away from its usual setting and digest it.

Inflammation. Let us say that every disease from whatever cause is an inflammation. An inflammation, according to the books, is interference or disturbance of the nutrition of a tissue or organ, characterized primarily by hyperemia and accompanied by certain definite symptoms. In a word, it is just about what we gave as the definition of pathology, except that pathology is a discussion of the series of manifestations following upon an exciting cause. Pathology, then, for our use, is only a *discussion of inflammation*. In this we find and present you our ideal in pathology. To go one step further, according to the texts the cardinal symptoms of inflammation are: "Redness, heat, swelling, pain and perverted function or febrile condition." These are the typical manifestations of the results or changes going on, which to be equally discernible must have an equally favorable locality to show themselves. Such a condition is rarely if ever found. We may have one or more present, but from the nature of the case there cannot be the same proportionate degree in all. Hard structure, as bone, will not exhibit redness or swelling; deep-seated inflammations may be too far from the surface to show readily; and so on. But in all we find or have good reason to believe present, if not easily seen, disturbance of the circulation and perverted function in part or whole. Thus it is easy to establish the analogy between ordinary inflammation and any localized structural disturbance. This analogy is much more difficult to establish in the minds of the students when we take a more general systemic excitement as the illustration. This requires more mental effort, and mental effort they cannot or will not make except after artful persuasion. Dr. E. C. Kirk once said that the most insulting thing he could do was to compel his classes to think. Doubtless all teachers agree more or less fully with that statement. A question that can be answered by rote is all right, but any turn or twist of an old, fa-

miliar question that requires a little hard thinking raises a row. The very thing that education means, if it means anything, almost raises a mutiny, or at the mildest is an affront to their self-love. Yet to stimulate the growth of the mind, to accustom it to think, should be the highest aim of every educator, whether engaged in general or special work. Just here the inquiry comes to mind if that aim is not too often overlooked partly or entirely in our dental educational institutions.

To return to our subject. There can be no doubt that it is difficult to always clearly see the analogy between a localized inflammation, as a furuncle, say, and an idiopathic fever, but it is there nevertheless. We have only to think that the cause is acting more generally in the one case than in the other, and the results may be seen under the glass to be the same. We see the blood current accelerated in response to the excitant, the increase in speed and number of the leucocytes, the rise of temperature in both, the increase of size by this rushing of more blood to a special or general alarm, and a more or less decided perversion of function depending upon the extent or duration of the excitement. In both instances there develops an increasing exaltation of nerve susceptibility ending in pain if prolonged extremely. These general similarities must be considered broadly and the analogy must cease when the large lines of likeness are lost in the minutiae of limited areas. Like the masterful sweep of the truly artistic brush, the minute is swallowed up in the salient forcefulness of the wide treatment and the discerning mind catches the idea and is satisfied. Students have not as a rule adequate discernment to hold a firm grasp upon the golden thread of the analogy, and once the end is lost they fail too often to catch it up again. Some of this uncertainty is doubtless due to the obscurity in the mind of the teacher. If the teacher is full of his ideal he will very naturally recur again and again, like a spider weaving his web, so as to give his classes frequent opportunity to see it clearly and reestablish a strong connection with the central idea. It is our aim to present the broad principle of inflammation so simply that it not only can but must be understood, never losing sight of it ourselves in any amplification. If the claim is made that it is too narrow, too much like the crudities of our earlier and less cultured years, we meet it by saying that teaching must be fitted to the taught without any reference to any preconceived ideas of fitness or technical fulness.

One clear and definite idea is undoubtedly worth a multitude of vague and uncertain theories that can never be crystalized into sensible, practical cognitions. This applies to teacher and student alike. Therefore, if this simple, clear idea may be once established in the mind there is something there that is his—something that he can digest and realize upon. He will soon be conscious of its simplicity doubtless, but from it as a basis he can surely reach out to other things, certainly and logically deduced from that certain idea in his own mind. Without some such simple idea in mind he is never certain, and like some wanderer in a bog, he goes falteringly from one uncertainty to another, fortunate if he succeeds in stumbling across, with no hope of return.

Oral Pathology. Let us now give some more practical application of our ideal to our own special branch, oral pathology. Take stomatitis, an inflammation of the mucous membrane of the mouth, ranging from the simple gingivitis to the most serious involvement of that tissue from a destructive, specific inflammation. Here we have a wide reach of conditions, from the infinitesimal and simple to the largest possible surface and complex specific involvement. The causation may, in fact does, differ, and may be the all-important task for the physician to undertake, but the symptoms are essentially alike, differing in degree rather than in kind. We have the capillary engorgement, sensitiveness to pressure, the solution of tissue where the inflammatory process has culminated in degeneration, the increase in size shown in the tumefaction—in a word, all the cardinal symptoms of inflammation open like a book.

Again, in the diseases of dentition. As you remember, the textbooks divide them into two classes—the true and the so-called. In the true, where the tooth germ, like any other tissue or organ, suffers from a real interference with its nutrition, we apply the measure as set forth above and we find local tenderness, redness, heat, tumefaction—in a word, all the symptoms necessary to establish its identity as a true inflammation. In the other, the so-called, we may just as easily prove the absence of all those symptoms locally and may boldly assert that whatever it is or is not, it is not a disease of dentition. Boldly is used advisedly in this connection, for the physicians will not always sustain you in this assertion. They have been known to diagnose the effects of teething in children who had all twenty deciduous teeth in position, and it is a bold, not to say a

rash, dentist to stand up for his convictions in the face of the irate family doctor. In the so-called diseases of dentition there is certainly some disturbance of the nutrition going on and, as we see it, Nature is engaged in a great effort to rid the system, especially the alimentary canal, of a less or greater mass of indigested if not indigestible substances. To call such efforts on the part of our inherent health principle a disease of dentition is just as sensible as to look upon dentition as essentially a pathological process with or without complications. There may be an interference with the process of dentition, attended by all or enough of the cardinal symptoms of inflammation to clearly show a case of inflammation, but with gums normal in color, no intolerance to touch, and none of the local signs of that process, it is wooden, to say the least, to acquiesce in such an idea. In the so-called disease there is certainly an error of nutrition, the digestive function is all upset, but there is no reason in the assumption that it is a disease of dentition because this disturbance happens about the time when certain teeth are due and may be erupting without any of the signs of inflammation.

In like manner we might apply our ideal to every form of that protean process called inflammation. It is not necessary that we find the certain cause of any inflammatory condition, although that is the wisest and best when possible for us to recognize the more or less definite presence of some or all of the cardinal symptoms; but when we can get this simple cognition as the basis of all such conditions we may feel that we can get on much more intimate relations with them and the pathology of all their breed.—*Items.*

INFECTIONS OF THE LYMPH-GLANDS OF THE MOUTH AND THROAT. By Dr. Robert T. Morris, New York. Read before the First District Dental Society of the State of New York, December 8, 1903. During the past year I have had occasion, among other things, to superintend the work of a clinic at which we see a great many patients who are suffering from infections of the throat and mouth—patients who are not subjects of careless dentistry, but who are so neglectful of the ordinary affairs of life that they do not carry out the instructions given them by their dental advisors. We also have a great many who have received no treatment for the common simple infections of the mouth that would be very readily and successfully cared for by any competent dentist.

The cases in our clinic among the poorer class are patients, I judge, who are not often seen by dentists except at the dental clinics.

In speaking of the lymphatics as a system of absorbents we are speaking not quite comprehensively, because the veins also do a great deal of absorbing. The lymph-vessels all empty into veins eventually, and are simply part of the vascular system. Veins and lymph-vessels carry very much the same infections, but with different accidents in the course of infection, and the accidents occurring in the course of infection from the mouth are such as interest us surgeons very much, and dentists presumably more.

The lymphatic system: its distribution and rôle in the production of infections about the mouth, throat, and neck.—To go over the subject of lymph-vessels very briefly: We are to remember that the smaller lymph-vessels begin as simple channels between cells. These gradually become lined with endothelium and form the lesser lymph-capillaries, then passing beyond the stage of endothelial tubes finally develop lymph-vessels with muscular coat and white and yellow connective tissue, and with lymph-nodes and lymph-chambers. With the lymph-chambers we are not concerned to-night; with the lymph-nodes we are. First let us consider this point: When the lymph-current is traveling through the lymph-vessels of the neck the lymph is arrested temporarily in lymph-nodes, and escapes richer in albumen and salts. If bacteria be carried struggling along the lymph-current they are arrested in the reticular layer around the lymph-nodes, and if arrested long enough, and if abundant enough, they begin to proliferate, and we have the enlargement of the lymph-node—the increase of the leucocytes forming the node—until the chain of lymph-nodes is enlarged, giving us evidence of infection of the chain of glands of the neck.

When the patients come to us with infections that have reached the lymph-nodes it is a matter of very nice diagnosis to determine whether the infection is from the teeth—from dead, decomposing contents of a tooth-root; from pyorrhea; from an area of superficial necrosis; from infection of the tonsil or the retropharyngeal lymph-structure; or from an infection of the palate. These are points that are not readily determined and require a very nice diagnosis, and it is certainly important for the dentist to be able to make the diagnosis well. In a general way we can determine from what point the infection is proceeding, by noting which group of lymph-glands is

chiefly involved. The deep cervical chain of lymph-nodes carries all of the lymph from the head. The sub-maxillary nodes parallel with the lower border of the mandible, before emptying into the jugular group, take infection chiefly from the anterior part of the mouth; infections of a deep cervical group of the lower carotid chiefly from the tonsil, and the infections of the sub-mastoid group chiefly from infections of the ear.

Some of you may not believe this grouping to be important in a diagnostic way, but I believe it is, because assistants first coming on my staff do not readily make the diagnosis of the point from which infection is proceeding, and it makes a great difference whether we begin work on an ear, on a tonsil, on the retropharyngeal lymph tissue or upon the teeth. We are finding in my clinic many more infections proceeding from the teeth than are found in some other clinics. A good many infections of the floor of the mouth begin from a focus in a simple pyorrhea—pyorrheas that are so common among the lower classes, among people who do not take care of the teeth, and these infections are apt to be passed off as something more serious by physicians. I presume dentists recognize them very readily, but as a rule infections of the floor of the mouth are not attributed by physicians to a focus of infection about the teeth.

Ludwig's angina.—A very common one is called Ludwig's angina. Cases of that kind with infiltration of the floor of the mouth without acute onslaught, not readily responding to treatment of any sort, very commonly arise from a focus of infection about the root of the tooth—not in the roots, but in the gingival membrane. These cases are apt to be subjected to surgical operation. Incisions are made and the patients are treated with ice and heat—all unsatisfactory, because the point of infection is not recognized; and we must be on guard always when a case comes in with infiltration of the floor of the mouth, general involvement of the lymph-glands of the floor of the mouth and of the subhyoid group—we must look for infection from the anterior part of the mouth, preferably from the gingival membrane rather than from the interior of the tooth-root. When we have infection from a tooth-root we are more apt to have acute onslaught, formation of fistula, and abscess without wide involvement of lymph-glands. The infections involving the lymph-nodes of the neck do not so often apparently proceed from infection of the tooth-root, but do commonly proceed from infection about the teeth.

When the group of glands of the lower carotid triangle is involved we may look for infection from the pharynx and may usually leave out the teeth altogether. In tuberculosis we generally have the group of glands behind the sterno-cleido-mastoid infected. The cases have not been well classed in our clinical records, and it is a fine distinction to make.

A class of infections frequently overlooked.—One class of infections, very dangerous ones, has been frequently overlooked by dentists—not from any fault of theirs, but because patients have not followed instructions to return for treatment. These are infections following the removal of abscessed teeth. Patients die and the cases are not reported; they come in to be treated for pneumonia. There are patients dying this minute in this city from the result of having abscessed teeth extracted while in the course of acute infection; there are cases dying continually in this city—not recorded and not discussed, for the reason that they are entered at our hospitals as cases of pneumonia; but they are cases of septic pneumonia, embolic pneumonia, resulting from infection from abscessed teeth. Very often the dentist knows nothing about it. He removes a tooth; he hears four or five days later that the patient has developed pneumonia—believes it to have been a coincidence, thinks his part in the case is not one of consequence, and the patient dies. The case is recorded as a death from pneumonia—not as septic pneumonia from an abscessed tooth. If one's attention be attracted to it, he will find many of them. I have frequently seen cases of most violent infection, of which the dentist who removed the tooth knew nothing. The physician caring for the case would seldom trace the cause back, and the simple statement of the patient that he had an abscessed tooth extracted a few days previously was not held to stand in any causative relation to the condition.

I judge when an abscessed tooth is extracted during the progress of acute infection little harm results ordinarily, but in these cases we have thrombi in the veins of the cancellous structure of the bone about the tooth, and when the tooth is extracted, if the cancellous structure of the bone be crushed but very little, the thrombi of the veins and lymphatics may become emboli, and we have embolic infections coming on and making their greatest demonstration three or four days after the accident has happened, and insidiously, not seeming to bear any relation to the real cause.

When an infection is proceeding acutely, either from the interior of the tooth-root or the gingival membrane, the bacteria proliferating rapidly, and before protective leucocytosis has become established—then is the time when we are to be most careful about doing meddlesome work about the focus of infection. After an infection has been under way for a few hours, if the patient has good powers of resistance, and has called out a well-marked local leucocytosis, the infection is met. The bacteria and the leucocytes in their struggle side by side have their fight out, the leucocytes win, the bacteria are vanquished, and at that time, even although abscesses may be in evidence, although infiltrations about the neck and the mouth may be marked to a degree, we can go ahead. This is an important point I would like to make—to avoid doing any operative work about a focus of infection in the mouth while bacteria are actively proliferating, and before leucocytes have met and vanquished them. That point can be determined by cultures or microscopical examination. Many a time I have sent my slides to the laboratory and have found that the bacteria were dead, the fluid was sterile, and it was safe to go ahead. If I had done anything twenty-four hours previously, I might have set up a dangerous infection that would have been hard to control.

Streptococcus infections the most common form—Treatment.—A great deal depends upon the form of infection. I find much more infection from streptococci than from any other bacteria in this infection. The streptococci are particularly dangerous during their stage of proliferation—they infect widely, and they dam the lymph-nodes so that abscesses form in the neck, in the floor of the mouth, about the throat, and it is a very important thing to know what to do for those cases and the time for doing it. It is important to distinguish between the stage of active proliferation and the stage when the bacteria have been vanquished. During the stage of active proliferation ice is frequently applied by dentists—perhaps just as often by physicians—wrongly. It gives comfort to the patient, takes away the unrest that makes a patient call for your services, and yet does not limit infection nor change the character of the process much. The use of ice for limiting an acute streptococcus invasion may postpone the time when danger is to come. It is not the quieting of the swollen tissues about the jaw with ice that is called for; it is increasing the power of the patient to manufacture

more leucocytes—general tonic treatment, treatment that shall distinctly increase his cell-resistance. That varies with the individual; we all have different degrees of cell-resistance. One man's cells are readily attacked by bacteria; another man's are not attacked at all. In one case, if a man be below par in health his cells become vulnerable, they do not resist, and that day or that week he is open to infection. One who has been suffering from an abscessed tooth with neuralgia, with pain, may not resist well. The important point of treatment is to increase his general power of resistance, and give more attention to that than the local treatment. Better give him whiskey and quinin, and fresh air, and horseback exercise every day than to put him in bed and put ice on the area that is undergoing acute infection. The same is true of the application of heat with poultices. I have patients coming in frequently who have been poulticed; it did relieve their irritability and restlessness, and yet it was not the best treatment, for it postponed the evil day.

The question of cold or heat in treatment.—I recently heard a discussion as to whether it was better to apply ice or hot applications in an acutely progressing infection—streptococcus invasion. That is a matter which goes with individual patients; one receives comfort from cold applications, another from hot ones. The only way to know is in the early days of one's practice. When a patient comes in calling for immediate relief from suffering, and the young practitioner applies cold applications, he may be sure that the patient cannot get comfort excepting from hot ones!

I recently saw a case of infection from an abscessed tooth; the lymph-glands about the floor of the mouth were involved. Ice had been kept on almost continuously for two weeks, the case not having been seen by a physician. The dentist had advised ice applications. The case is now one of chronic infection. There will always be a thickening of the floor of the mouth; the patient will always have difficulty in speaking well; he will always have a thick speech and awkward movements of the mouth and throat—for the single and simple reason that ice was applied for two weeks to control that condition. If no ice had been used in the case at all that patient in all reasonable probability would have been perfectly well to-day.

Infections from the staphylococci do not so often result in abscesses of the throat and beneath the mandible as infections of the lymph-

glands and lymphatics from streptococci. The treatment does not always take into consideration the bacterial invasion.

Some things to be avoided.—It is important to avoid scarring. The opening of the abscesses is done personally by some dentists, and by others referred to surgeons, but many times I have seen cases at clinics where abscesses of the floor of the mouth had been opened with a rather long incision. We were certain to have an unsightly scar, which was unnecessary, because at the time when the abscesses are formed from infected lymph-glands in the floor of the mouth and the throat the fluid soon becomes sterile as a rule, and we need not make a long incision for emptying these abscesses. That is a point which is overlooked. It is not discussed in the journals, and not spoken of in general conversation. We need not make a large incision for the purpose of evacuating the pus. With a small trocar needle we may draw off part of the fluid contents, wait three or four days, withdraw a little more, and so on. You will be surprised to see that meanwhile the lymph-vessels are taking up the fluids themselves; there is less fluid each time, and repair will go on without scar formation if we withdraw the pus through a small needle, a little at a time from an abscess that needs evacuation. When an incision is made and the abscess is evacuated the tendency is to make pressure on the abscess wall—by everyone who has not had an abscess himself. The collection of fluid is surrounded by a prophylactic membrane or by the products of leucocytes protecting the area. If we are very careful not to press out the pus, not to make any pressure upon the tissues, the case will run its best course. Nature gives us a clue in our feelings; anyone who has had an ordinary abscess does not dread so much the incision as the pressure made immediately afterward with the fingers. The latent bacteria may be aroused if we do the wrong thing—and the wrong thing is usually done. We also feel that we must wash out all the pus and do something to the floor of the cavity. These cavities are often washed out with hydrogen dioxid. This is very valuable in its place, but if the collection of fluid be sterile it does damage. It attacks the wall of leucocytes, breaks them down, and you can get a new invasion after its use. By using it when granulation is under way we may destroy the granulations; in this way a most valuable and useful resource is very commonly used wrongly—still holding to the wrong idea that we must get the interior of the abscess clean. It is a gross idea

of cleanliness, one that appeals to most of us naturally; there is a feeling that we must get all that pus out. But there is nothing to that pus; it is most bland, and usually sterile, and altogether a most delightful thing to have in that cavity. Let the tissues gradually contract about the cavity and force the pus out without the formation of connective tissue that would later contract and make an ugly scar. The more we disturb this area the more connective tissue we will have and the greater degree of contraction will follow, such as always occurs in new connective tissue. The contraction and the scarring result from the meddlesome treatment that appears to most physicians—I hope not to most dentists—to be necessary!

Tuberculous infection.—The infections of lymph-glands occurring in actinomycosis or from the pneumococcus I need not discuss, but the infections that go with tuberculosis must be separated from those that go with acute infections from the floor of the mouth. This is not easily done; I have had to make sections or cultures to determine whether I was dealing with tuberculosis or with an infection from the tooth-root or the gingival membrane. It is not always easy to distinguish between tuberculous infections of the lymph-glands of the mouth and throat and infections from the staphylococcus, streptococcus, and other bacteria. With tuberculosis, however, we are apt to have a previous history that gives us a clue—a very slow involvement of a large number of glands in a mild way at the outset, and gradually slow development and increase of the infected glands without marked swelling or redness or pain—without evidence of acute progression of infective invasion. The glands gradually become enlarged without very much attention being attracted to them. In tuberculosis we are almost certain to have at the outset a group of glands at the outer side of the sternocleido-mastoid involved. That is so common that we are not likely to make a mistake, and yet I did so recently in two cases—thought I was dealing with pyorrhea and found tuberculosis. They are going to get well, too—those two cases. In many of these tuberculous cases the patient dies; operation is useless, we cannot save them. There are many cases, however, that will respond to iodoform injections, and in those two instances that I found to be cases of tuberculosis in the floor of the mouth, after first thinking them cases of tooth-infection, we have been injecting iodoform and ether, each gland separately—a drop of cocain first, then iodoform and ether—picking

out two or three glands at a time, and injecting at intervals of three or four days. That treatment will occasionally be effective, and when it is we are very fortunate.

Special need for developing cell-resistance.—Meanwhile, in this infection of the lymph-glands of the floor of the mouth we have particular need for developing the patient's general cell-resistance. Instead of putting him in bed, give him quinin and wine and roast beef and good things. Let him stay out of doors, play golf, and go fishing and shooting (and send us the game). Let him do all the things that develop general cell-resistance. Do not put him in bed and put your finger on the infected glands, and say, "We are to focus our attention upon his glands," for our focal range is too short and we do not take in the whole patient! In dealing with infections of the lymph-glands of the floor of the mouth and the throat, let our range take in the entire patient, and "relax our accommodation," as the ophthalmologists say, when looking at the glands themselves.
—*Cosmos.*

DENTIGEROUS CYSTS.—By Charles Greene Cumston, M.D., Boston. Read by invitation before the Harvard Odontological Society, October 29, 1903. In considering the subject of dentigerous cysts a few remarks on the pathology of same may not be out of place, as the literature is rather meager relative to the condition under consideration. The first important work on the subject was published in 1872 from the pen of the well-known Parisian dentist, Magitot. After a careful study of all material he had at hand Magitot gave a systematic classification of dental cysts, and at the same time he took their etiology into consideration.

As most of the writers who have studied this question since Magitot's paper appeared have concurred in most of the statements therein found, it would seem proper to consider his paper a little in detail. Magitot regarded every cystic production lined with a membrane and situated in the interior of the jaws as a maxillary cyst. These cysts usually contain fluid contents varying in nature from one case to another; they may be thin and fluid or thick and pasty. Every cystic production arising spontaneously in the maxilla usually originates from a tooth. Magitot also believed that if a foreign body penetrated the jaw a cyst could form around it, and this fact has been proved by a case long ago published by Maison-

neuve. Cysts developing spontaneously he termed progenous cysts, and, in contrast to these, those developing around a foreign body he termed perigenous cysts. To these two forms which develop in the bone substance he added a third type, to which he applied the name of neogenous cysts, which develop outside the osseous tissue. Magitot subdivided follicular cysts into embryoplastic, odontoplastic, and corona-forming-period cysts, according to the time of their development, and he again subdivided them according to the nature of their contents into serous, colloid, and caseous cysts.

By the classification given it is readily seen how Magitot accounted for the formation of progenous cysts. From some influence he believed that the enamel may perish in different stages of development by either resorption or by maceration. The dental sac then slowly develops by a proliferation of its structures. The contents found in embryoplastic cysts will be composed of shapeless embryonal dental elements, in those of the odontoplastic cysts more or less regularly developed tooth elements will be present, while in cysts arising during a later period of dental development coronal structures should be present.

Magitot believed that neogenous cysts arise in the periosteum of the root, and he supposed that this membrane undergoes development by proliferation of its cellular structures, and thus forms a cystic sac. The primary causative factor is an obliteration of the canal of the root due to an inflammatory thickening of the periosteum following infection from the canal of the root or by formation of a denticle in the pulp. The epithelial lining of these cysts is derived from a marked proliferation of the connective-tissue cells.

Although Magitot unquestionably did much to enlighten us on the question, he could not reconcile his theory with facts, namely, that the epithelium could arise as if by regeneration from the connective-tissue elements. It was naturally most important to discover the true origin of the epithelium which is exclusively found in neogenous cysts when it has not become destroyed by a suppurative process of the contents of the cyst.

In 1885 appeared a paper by Malassez, and it is to him we are indebted for discovering in the maxillæ of embryos in different stages of development that during the period of the formation of the teeth there takes place, besides the physiological proliferation of the epithelium for the formation of the dental follicle from the

embryonal enamel, other proliferative processes, arising both from the organon adamantinae and from the mucous membrane. These epithelial masses are in structure exactly like the enamel organ, arranged around the root of the tooth in various manners. They are also found present in normal lower jaws of adults, and he came to the conclusion that these epithelial masses persist not only during the period of dentition, but are normally present during adult life. He asserted that not only the neogenous cysts of Magitot, but also every other neoplasm having an epithelial character developing in the jaw, especially multilocular cystomata and cystadenomata of the maxilla, originate from these masses of cells which he terms paradental epithelial debris.

The conclusions arrived at by Malassez were examined and found correct by other investigators. Von Brunn especially has given a satisfactory explanation, basing his assertion on the writings of Hartwig, published in 1874, and he shows how the epithelial masses, preexisting around the root of the tooth, become constricted by the fetal enamel organ, and from its connective tissue with the epithelium of the buccal mucous membrane. If Malassez's theory relative to the origin of periodontal cysts from the paradental cell agglomeration is correct, these cysts should occasionally be met with in their early stages, and, in point of fact, Witzel published a paper on cysts of the roots of the teeth in 1896, in which he fully describes them and gives a satisfactory explanation for the development of periodontal cysts. He points out that one occasionally finds tumors varying in size from the head of a pin to a pea in extracted teeth, especially when they are the seat of caries. These neoplasms are sometimes spherical in shape, at other times egg-shaped, varying in their connection with the roots, sometimes being near and sometimes being distant, while occasionally they are pedunculated.

On section these small, grayish-white bodies will be found composed of one or more cavities containing serous contents. Microscopically the external layer of these minute growths is composed of a rough connective tissue, then by a layer of tissue abounding in blood-vessels and leucocytes, while the cavities are lined with epithelium. The larger cystic cavities show a more evenly distributed epithelial layer, while in the smaller ones the thickness of the lining epithelium varies considerably. We consequently are here dealing with a miniature cyst which on account of its diminutive size has

never given rise to symptoms. The microscopical examination of well-developed cysts exactly corresponds with these small pathologic productions described by Witzel.

In the first case of dental cyst that I have to report the lining membrane consisted of several layers of flattened epithelium, and outside of this was a connective tissue layer measuring about $1\frac{1}{2}$ millimeters in thickness. Outside of this connective tissue layer was found another of connective tissue in which nuclei were easily distinguished. The history of the patient was briefly as follows: She was a well-built girl of twenty-five, who had always enjoyed good health. About three years ago she noticed for the first time a small bunch under the left nostril. This small growth gave rise to no pain, but continued to grow slowly until at the time of the patient coming under observation, the left nasolabial fold had completely disappeared, while a tumor about the size of a large walnut was found immediately underneath the labionasal fold. The skin covering the growth was movable, while the left nostril was pushed upward. By palpation fluctuation could be detected. Under ether narcosis the growth was incised, giving issue to a transparent serum. The opening was enlarged, and it was then found that a cavity existed between the nasal cavity and the antrum of Highmore, into which the apex of the root of a small incisor was found protruding. After extraction of the tooth and removal of a corresponding part of the alveolar process the cavity was plugged with gauze and the skin incision united by wire sutures. These were removed on the fifth day, and the patient was discharged well in three weeks.

It is easy to understand why we have a flattened epithelium in large cysts, while in the smaller ones cubic epithelium is present, because it is well known with what ease epithelial cells adapt themselves to the amount of pressure brought to bear on them. In all the cases of dentigerous cysts which have come under my observation the microscope has revealed practically the same histological structure, but in some instances the epithelial layers were so thick that the lining membrane of the cyst was readily peeled out from the cavity. Such was the condition found in the two following cases: A healthy boy ten years of age had had what was called by the mother a swollen cheek for over three years. The swelling had apparently never given rise to any pain. It had slowly increased until at the time the boy came under observation the deformity was

very marked. By palpation a tumor the consistency of bone was found in the anterior aspect of the right superior maxillary bone. The nasal cavities were normal. Under ether an incision was made over the most prominent part of the growth, the gum was stripped back, and the bone opened with the chisel. This led into a large cavity lined by a whitish membrane, which was easily stripped off and removed. The cavity contained a light-yellow serum, but no evidence of any tooth could be found within it. On account of the large size of the cavity, which might be estimated that of a small hen's egg, it was deemed more prudent to obtain drainage through the nose, so a communication was made with the right nostril and a drainage tube inserted. In terminating the operation a portion of the anterior wall of the jaws was removed so that the cavity might contract more rapidly. Drainage was continued for a week, after which time the wound was found to be granulating nicely, and the patient was discharged cured at the end of four weeks.

The next case was a man thirty-seven years old, who for about eighteen months had noticed the presence of a tumor. The swelling was hard and had slowly increased in size. By examination an oval tumor was found situated in the neighborhood of the third molar on the left-hand side, and might have measured in size that of a large English walnut. Under ether the last molar on the left was removed, and it was then found that we were dealing with a rather thick-walled cyst of the jaw. The cavity was split open with the chisel, and by exploration it was found to communicate with the antrum of Highmore. It was lined with a thick, whitish membrane, which was easily removed by blunt dissection. Drainage was obtained by making an opening into the nasal cavity, and a rubber tube was inserted, the cystic cavity being plugged with gauze. No evidence of a rudimentary tooth could be detected within the cavity. The liquid contents consisted of a thick, light-yellow serum.

Now, if we assume that these periodontal cysts are produced by an irritative process arising from the paradental epithelial debris of Malassez, and that the cavities increase in size on account of an increase of their fluid contents, we have all the conditions found in cysts of long standing explained. A cyst will naturally grow in the direction of the least resistance, and since the root of the tooth is firmly lodged in the alveolar process by its periosteum, the bone, being less resistant, gives way to the pressure. On account of the

pressure on the surrounding structures produced by the growing cysts, the vessels and nerve supplying the tooth and periosteum of the root undergo pressure atrophy and resorption. Thus may be explained the absence of periosteum covering the root and the apices projecting into the cavity of the cyst, although their presence is by no means constant.

The perigenous cysts of Magitot can be explained by a foreign body directly in contact with or in the neighborhood of the so-called epithelial streaks of Brunn. This produces a constant irritation, which finally causes a proliferation of the latter, and to this type those cysts in which fully-developed teeth are found present belong in all probability. It is easily conceivable that a tooth which did not make its exit from the jaw from faulty position or some other similar circumstance becomes enclosed in the maxilla and at length plays the part of a foreign body, causing the epithelial streak to proliferate. It would appear that such cysts are generally considered under the head of follicular cysts, but under these circumstances it is difficult to explain the presence of fluid. However, if we adopt Malassez's theory it will be found to explain the formation of these cysts very well. One such case has come under my notice, the history of which is briefly as follows:

A woman sixty-four years old had had all her lower teeth removed several years before. About twenty months before coming under observation a swelling made its appearance on the angle of the right jaw. The tumor gradually increased in size, so that when the patient was first seen it was as large as an egg. Later a certain amount of pain had been felt in the growth, the latter had become very tense, and the patient complained of much annoyance from a throbbing sensation more or less constantly present. Under ether an incision was made through the skin over the most prominent part of the growth, and while peeling off the periosteum of the ascending ramus of the lower jaw a cystic cavity was opened, giving issue to a considerable quantity of malodorous pus. The cavity was at once enlarged, and by digital exploration the root of a tooth was found protruding into it. The root was extracted and the cavity thoroughly curetted and drained. The patient made an excellent recovery, although drainage was necessary for over three weeks on account of a more or less abundant discharge of pus, but she eventually recovered without a fistula.

If a tooth develops normally it is evident that it can never become entirely enclosed within a cyst, but its root may be contained within the cavity, and this is what is found in the larger number of cases. Most of the text-books on surgery are very deficient in explaining the pathology of these cysts, and even commit gruesome errors in their statements. It is an unimpeachable fact that one tissue can reproduce only itself, and consequently epithelium can be derived only from epithelium; and it is also well known that the lining membrane of these cysts is always epithelial and never composed of granulation tissue. Now Malassez's theory explains satisfactorily the absence of the periosteal covering of the dental roots protruding into these cysts, but the cause giving rise to the proliferation of the epithelial streak of Brunn and to the formation of a periodontal cyst is not so easily demonstrated. Without any question an inflammation of the membrane of the root may be the starting-point of this process, and many cases unquestionably do originate in this way. In such cases caries of the tooth and inflammation or gangrene of the pulp must have preceded, but if the root of a perfectly normal tooth is found protruding into a cystic cavity, where there is a complete absence of all signs of a periodontitis, or if no trace of tooth is found within the cavity of these cysts, such as has been observed, we consequently must admit that there are other causative factors existing. It is possible that traumatism may be the starting-point of some of these cysts, because the lower jaw is particularly well placed to receive external injuries, and it is a well-established fact that retained teeth may be the cause of periodontal cysts. But it is also well demonstrated that a perfectly normal tooth may be the etiological factor when such a tooth is deviated from its normal position, an example of which will be found in the following case:

A boy seventeen and a half years of age had always been fairly well excepting for the ordinary ailments of childhood, but for eighteen months he had suffered more or less intensely from tooth-ache. About five months ago he first noticed a slowly-growing tumor on the left side of his cheek, but the growth did not give rise to any pain. Examination showed that the tumor extended from the left nostril underneath the malar bone. The skin covering the growth was not reddened, and was found freely movable over the tumor. The teeth were in extremely bad condition. The left upper cuspid appeared healthy, but it pointed directly backward in an

oblique direction. At this point the superior maxilla presented a swelling extending from the labial to the palatinal aspect. Crepitation could be elicited on pressure. Under ether an incision was made over the tumor, attacking it from inside the mouth, and when the cavity of the cyst was opened a large amount of thick, ill-smelling serum made its exit. The opening into the cyst was enlarged, the cavity being found lined with a smooth, glossy membrane. The apex of the root of the cuspid was found protruding into the cystic cavity and was extracted. The alveolar edge was chiseled away and the cavity packed with gauze and drained. The patient made a rapid and uneventful recovery. Examination of the tooth extracted showed that the apex of the root was bare of its periosteum.

On the other hand, the retention of developed teeth does not necessarily produce the formation of a cyst, as has been proved by several cases reported in literature. In one case reported by Hildebrand, that of a boy during his second dentition, he removed from the upper and lower jaws over two hundred perfectly-developed teeth without any evidence of cystic formation around any of them.

It would appear that the period of dentition may also play an important part in the etiology of periodontal cysts, and this should not seem surprising, because at that time processes of resorption and regeneration are taking place everywhere in the maxillæ. Now, during such a time of active metabolism there is no reason why an increased activity may not be present in the epithelial streak of Brunn. In many cases periodontal cysts do make their debut during the period of the second dentition, but in other cases the cysts begin to develop long before this period, as has been proved by certain cases reported. The second case narrated in this paper in all probability enters into this class, because evidently the cystic formation commenced at an early time in the dental development, and, in point of fact, microscopical examination showed a picture closely resembling an embryonal dentinal sac. This type of cyst may always be suspected if the tooth corresponding to it is absent, and this is an important point to be noticed in making a diagnosis. It may also occur that although the entire set of teeth is intact a supernumerary tooth follicle may undergo cystic transformation, but such instances must be very rare. The cause of the cystic transformation is as yet unknown.

It may not be out of place to refer to a certain class of tumor

which perhaps in reality does not strictly belong to the subject of this paper, but whose histological nature and origin are closely allied to that of periodontal cysts. The tumors to which I refer are usually encountered in the lower jaw near its angle. They suddenly begin to develop after they have been present for a number of years in a latent state, so to speak, and when they commence to increase in size they do so very markedly. Traumatism is usually the cause of their sudden increase in size and growth. After they have attained a certain size they present symptoms of cysts, namely, fluctuation and parchment crepitation. These cysts have been treated by incision, curettage, and drainage, which have rarely been the means of curing them, and in most instances an extensive resection of the jaw has been necessary.

These cysts have been described by a number of surgeons. Some of them have been multilocular, while others were unilocular. Microscopically they are found composed of small cavities or canals, the inner wall of which is lined with an epithelium of the cylindrical, cubic, or polygonal type, while in the larger cysts it is flattened. Malassez believes that these cysts also originate from the paradental epithelial debris, but the reasons why in one case a simple periodontal cyst should develop, while in others cystomata or cystadenomata arise, is as yet insufficiently explained, but a large number of authorities agree that the original epithelial cells of periodontal cysts originate from the enamel organ, while the other types of cysts take their origin from the buccal mucous membrane.

As I have already stated, the development of dentigerous cysts is caused by the increase of the fluid contents, which is evidently constantly secreted by the lining membrane of the cysts, and the development of the growth naturally extends in the direction of least resistance. The bony structures of the jaw enveloping the cyst become thinner and thinner until finally they entirely disappear by pressure atrophy, and then the cyst assumes a soft consistency. If the cyst continues to grow, the soft parts covering it become thin, and finally the cyst ruptures and its fluid contents are evacuated spontaneously. This, however, rarely happens, because operative interference is usually undertaken before a marked development has been reached. I have had one case of this description, which I will here briefly report:

A man aged thirty-two had complained of an inflammation of the buccal mucosa covering the root of the first molar on the left side about eighteen months before coming under observation, and at the same time he noticed a swelling appearing under the left nostril. A few weeks later the tumor opened spontaneously and a considerable amount of pus escaped. On examination a fistula was found near the root of the left first molar, and the patient stated that the swelling would increase in size and then give exit to quite an amount of pus, after which it would decrease. The pus was always discharged through the fistula. When the tumor would increase in size on account of the collection of pus within it gave rise to a certain amount of pain. In other respects the patient was entirely well. The skin over the tumor was movable and not reddened. An incision was made over the tumor, including the fistulous opening, which gave exit to a yellowish fetid pus. The anterior wall of the alveolar process was resected, and then a cavity lined with a membrane was exposed. The cyst sac was carefully dissected out and the cavity packed with gauze. This was removed in three days and the patient was discharged well in eighteen days.

The fluid contents of these cysts are usually serous, and it is only after secondary infection of the cyst has taken place that the liquid becomes purulent. Infection can occur very easily from the buccal cavity or from the remains of teeth within the cyst. In those cases where decayed roots protrude into the cystic cavity infection may also arise from the canal of the root.

Regarding the diagnosis of dentigerous cysts, it may be said that when the growth has reached a certain size but little difficulty will be experienced. We will here find a circumscribed unilateral swelling of the bone giving rise to a parchment crepitation and a fluctuation. If there is any doubt, an exploratory puncture will in most instances give issue to a serous fluid. In the early stages of the process, when the swelling of the bone is of small dimensions and the tumor hard to the feel, the diagnosis is less easy, because in this condition the cyst resembles any circumscribed tumor of the jaw. The absence of pain during the entire progress of the growth will aid one in making a differential diagnosis. Dentigerous cysts might be mistaken for cystomata, but it should be remembered that the latter growth are found almost exclusively in the lower jaw. Suppurating dentigerous cysts may simulate an alveolar abscess, but if

the topography of the parts be remembered an erroneous diagnosis can hardly be made. If the cyst should burst into the antrum of Highmore a primary empyema of this cavity would arise, and, *vice versa*, an infected cyst of the superior maxillary opening on the outside might easily simulate an empyema of the antrum if the cystic sac protruded into the cavity, completely filling it.

The prognosis of dentigerous cysts is in every respect benign. The only serious complication that might arise is when a cyst of the lower jaw becomes infected, because the danger then would be that the pus might extend and infect secondarily one of the large veins of the neck, but this is only a supposition of my own, for I must confess that I have been unable to find any such instance recorded.

The treatment of these cysts is simple. They should never be punctured unless for diagnostic purposes, and after this, when the diagnosis has been made, operation should be immediately undertaken. In undertaking the surgical cure of these cysts it is absolutely necessary to remove all vestige of the lining membrane, otherwise a relapse is practically certain to arise. In order to do this the cavity should be freely exposed by a large opening, and the curet, scissors, and, if necessary, the thermo-cautery should be freely used, because if any epithelial cells remain within the cavity they can regenerate and cause recurrence. After the cavity has been thoroughly cleared of its lining membrane it should be plugged with gauze for a few days, so that the epithelium of the buccal mucous membrane and the granulations arising within the cystic cavity may unite, so that the latter becomes filled and leaves only a slight trace behind it. If any tooth or root is found protruding into the cyst it should be removed. In large cysts it may be necessary to drain through the floor of the nose, as was done in one or two cases here reported. When dealing with these cysts developed in the lower jaw it is oftentimes impossible to reach the tumor by way of the buccal cavity, and it must be attacked through a cutaneous incision. In this case it is indicated to remove as much of the lining membrane of the cyst as possible, and to accomplish this a sufficient resection of the outer shell of bone should be done.—*International*.

SOME OF THE CAUSES WHICH LEAD TO FAILURE OF FILLINGS. By C. N. Johnson, L.D.S., D.D.S., Chicago. Read before the G. V. Black Dental Club of St. Paul, February 19, 1904. It is not intended in the present paper to cover all of the factors which lead to failure in filling teeth, but to emphasize some of the more important ones, and to give a suggestion here and there as to how these failures may be avoided. By this it is not intimated that it is possible in all cases to avoid failure. In filling teeth we are hedged about by various limitations, to overcome all of which would border on the miraculous, and yet a clear conception of the conditions which lead to failure and an intelligent application of the principles best calculated to prevent it will place us in a more enlightened relationship to the matter and enable us to avoid many of the more common forms of failure which day by day confront us on every hand. If we do not carefully study the causes of failures we are not likely to make much progress toward their elimination.

The first consideration naturally relates to the preparation of the cavity, and the initial step in this procedure is to establish the cavity outline. With proximal cavities there is a well-defined principle involved which needs no reiteration at my hands, but to round out the subject of my paper, I will simply state that in the clinical observation of the manifestations of decay in proximal surfaces it is found that there is a certain area of these surfaces which is more subject to the attack of caries than any other areas of enamel lying adjacent thereto, and the nearer we extend the outline of the cavity to the angles joining the proximal surface with the other axial surfaces of the tooth the more certain we are to avoid a failure through recurrence of decay around what may otherwise be a perfect filling. In other words, the line between filling and tooth should be placed at a point where it is habitually wiped clean by friction in the natural processes occurring in the mouth.

In this connection it may be well to make one admission. It is not contended that every case of recurrent caries around a proximal filling is due to lack of extension of the cavity outline. We may have failure of these fillings from various causes, such as defective enamel margins, imperfectly placed filling material, imperfect contour, imperfect finish, etc., but when we find failure, as we frequently do, along the buccal and lingual margins of fillings, in which all of the other requisites of a perfect operation are present, then we have a

right to assume that the failure is due not to faulty manipulation, but to faulty environment, and it is this environment which we want to change by a proper cavity outline. In considering outline on the occlusal surfaces we have to deal with the question of fissures in the enamel leading from the cavity. Unless the cavity is extended to include all fissures radiating therefrom, an element of danger is left at the intersection of the fissure with the filling, and many fillings have failed from this cause.

In preparing cavities the question of anchorage becomes an important consideration in guarding against failure. Fillings frequently fail by being forced out of the cavity under the stress of mastication when the anchorage form is not such as to hold the filling mechanically in position. To avoid detail it is sufficient merely to state that fillings anchored upon flat walls will sustain greater stress without movement than when anchored upon curved walls, and that the area of the seat of the filling should be proportionate to the amount of resistance it is expected to withstand. An inadequate resistance area will result in the filling moving slightly under stress even if it is not entirely dislodged, and this movement will soon lead to a leak around the filling, which invites failure. In line with this idea, all seat walls which are calculated to receive stress should be placed as nearly as possible at right angles to the direction in which the stress is applied. Example: the gingival wall of proximo-occlusal cavities should be horizontal and flat instead of concave.

Another requisite for permanence is that fillings shall have sufficient bulk for strength, particularly at points which are subjected to heavy strain. In cutting a proximo-occlusal cavity the step should be made deep and wide enough to give appreciable bulk of filling material at the point where the proximal portion joins the occlusal portion, otherwise the filling may break at this point, allowing the proximal half of the filling to tip away from the cavity and admit a leak.

A source of failure in filling teeth which is often ignored relates to the practice of leaving appreciable masses of decalcified dentin in the interior of cavities with the idea of protecting the pulp. This practice was advocated some years ago and was all the more readily adopted because of the discomfort sometimes encountered in a thorough removal of all softened tissue, and in the frequent danger of exposing the pulp. But this decalcified mass is a menace to the

success of a filling in two important particulars. From the very nature of it it is saturated with poisonous matter, and no amount of medication can entirely eradicate this if the mass is at all extensive. The effect of sealing this poisonous material close to the pulp is frequently to subject the latter to a lingering death even in those cases where it is not immediately overwhelmed and destroyed. Another objection to leaving much of this decalcified tissue is the ever-ready invitation to a recurrence of decay. With this under a filling the slightest leak around the margins will at once lead to a rapid undermining of the filling, and a complete collapse of the filling and walls of the cavity. Not only this, but the softened tissue is a constant invitation to sensitiveness in a filled tooth, and the ostensible object of leaving it is thereby frequently defeated. It should be the rule in cavity preparation to remove every particle of softened tissue in all cases where its removal will not cause actual pulp exposure, and in those cases where an appreciable mass of badly infected tissue surrounds a horn of the pulp it had better be removed even at the expense of a slight exposure. The pulp will stand a better chance of life and comfort under the protection of an antiseptic pulp-capping than when enveloped by so much infected dentin.

The next consideration in cavity preparation to avoid failure is the proper management of enamel margins. The enamel is composed of rods or prisms, which in a general way stand with their ends on the dentin and radiate outward. If the enamel margin is so shaped around a cavity that the peripheral ends of the rods are left unsupported it is only a short time before the margins will crumble away, leaving a defect between the enamel and filling, followed by a subsequent leak. To avoid this form of failure all enamel should be so shaped that it is perfectly supported by dentin or protected by filling material—the degree of bevel for this purpose being regulated by the particular locality of the cavity outline and the consequent direction of the enamel rods, and also the probable extent of wear against this particular part of the margin.

If the foregoing precautions are taken in the preparation of the cavity the chief essentials in guarding against failure may be said to have been attained so far as this part of the operation is concerned, and the next consideration relates to the insertion of the filling material. It may be said in passing that the use of an unstable intermediate between the filling and the cavity is a more fruitful

source of failure than the profession seems to realize. In very deep cavities, where the pulp is nearly exposed and it is undesirable to introduce a metal filling so near the pulp, it is a wise precaution to insert a lining in the deeper portions of the cavity before placing the metal. This lining should, of course, be as nearly as possible a non-conductor of thermal changes, and this has led many operators to the use of gutta-percha for this purpose. Gutta-percha from its very nature is not sufficiently stable or rigid to furnish a suitable foundation upon which to build a filling, and the fact that it will yield slightly under pressure is a ready explanation of many of the failures we find around fillings anchored upon it. The slightest compression of the gutta-percha results in a movement of the metal filling covering it, and this leads to leakage and general insecurity. A more suitable intermediate is found in oxyphosphate of zinc which, though not so perfect a non-conductor as gutta-percha when once set, presents a more rigid base and is not so compressible.

In the insertion of a metal filling one of the most fruitful sources of failure is imperfect adaptation of the filling material to the cavity walls. Unless a cavity is perfectly sealed it can not be considered safe, and with metal fillings, whether of gold, tin or amalgam, an intelligent application of force must govern the insertion of the material, else a leak will jeopardize the success of the filling. The fallacy that amalgam may be plastered into a cavity without applicable force, and the resultant operation perfectly exclude moisture from the cavity walls, has led to many failures with this material, as has also the attempt to employ cohesive gold throughout an entire filling in regions where, on account of difficulty of accessibility, non-cohesive gold might with equal care have more certainly and securely sealed the cavity against leakage. The character of force and the manner of applying it for the hermetical sealing of cavities in the insertion of metal fillings is a study of great importance, and one which, if conscientiously carried out by the profession, would tend to reduce very materially the number of failures in our filling operations.

In line with this study comes the question of perfect density to our fillings—the avoidance of air spaces throughout the structure of the filling. While this is not so prominent a source of failure as is imperfect adaptation, yet it is a very important factor governing the ultimate success of a filling. These air spaces lead inevitably to

disintegration, and while we do occasionally see some very ragged looking fillings preserving the teeth for years on account of good adaptation to walls, yet a partially disintegrated filling can never be considered safe from general collapse. The avoidance of air spaces in building up a filling relates to the proper placing of the different layers as the filling is under construction, and to the requisite degree of force and the manner of applying it in condensing the material. This is true of amalgam as well as of gold, though the danger of leaving air spaces in the latter is of course greater than in the former.

In making proximal fillings a very prevalent source of failure is traceable to the imperfect form that is sometimes given them. The normal form of the teeth on the proximal surfaces is such that with ordinary care food may be kept from lodging between the teeth and remaining there for any length of time. This is attained by a rounded form to this surface with a small and rather prominent contact point, which refuses to hold fibers of food when they are forced between the proximal surfaces in mastication. In the making of fillings they are frequently not sufficiently contoured to reproduce this small rounded contact, and the result is a more or less broad and flattened surface, which invites the lodgment and retention of food in the interproximal space. This retention of food is not only a source of great discomfort to the patient, but it also inevitably leads to recurrence of decay around the filling, besides forcing the gum from the interproximal space and creating a pocket between the teeth, which is frequently the forerunner of disease of the periodontal membrane. No matter how perfectly a cavity may be prepared and the filling adapted and condensed, the operation must be considered a failure unless the proximal surface is so contoured that perfect protection is afforded the gum septum, and the retention of food is prevented.

One further source of failure is to be found in the imperfect finish which is sometimes given a filling, particularly in the gingival region of proximal fillings. In the insertion of these fillings it is necessary to overlap the enamel margins somewhat with the material to be assured of adequately covering the margins, and the failure to remove this surplus material and trim the filling to a perfectly symmetrical outline with the surface of the tooth leads to a ledge being left around the filling which catches and holds foreign material to decompose and start fresh decay.—*Review.*

The Dental Digest.

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Where All Communications Should be Addressed.

Editorial.

IS THERE A SOCIAL PREJUDICE AGAINST DENTISTS?

In one of the fashionable clubs of New York City an incident recently occurred that illustrates one of the peculiarities of modern social life. Although no hint of it was permitted to reach the outside world at the time, the club was kept in a turmoil for several weeks by the proposal of a certain man for membership. Only one objection was raised against him, and that had nothing to do with his personality. His bitterest opponents freely conceded that in so far as education and character could make a gentleman he was one, and, moreover, it was generally recognized that he had the wealth necessary to maintain the standards set by the club. Nevertheless the sentiment against his admittance to membership was overwhelming, and his application was withdrawn. It was his profession, and his profession solely, that caused all the trouble. The applicant was a dentist.

In discussing the incident one of the members of the club who had been most active in opposing the dentist said: "I am free to confess that my opposition was based upon blind prejudice, but in justice to myself I think I may say my prejudice is merely the reflection of the prejudice of my associates. By nature I do not think I am a snob. At the same time I know none of my friends would care to meet a dentist socially. I should never dream of inviting a dentist to my home, and one does not care to have as one's fellow club member a man one is not free to take everywhere and invite everywhere. Look at the facts. Can you point to a dentist anywhere in the United States or England who occupies any sort of a social position? I grant that the social prejudice against dentists is unreasonable.

Modern dental surgery is undoubtedly a science the mastery of which requires a high order of intelligence, and it is difficult to see why a man who practices it should not rank with the ordinary surgeon and physician. Yet the ordinary surgeon and physician are gladly received where the door is slammed in the face of the dentist. I notice that a Chinaman of noble birth who has just written a book about the United States was struck by this peculiarity of our social life. He inquired diligently as to its reason, and the only explanation it seems that he ever got was that it was part of a dentist's duties to clean teeth, it being argued that no gentleman of culture and refinement would ever stoop to such work. The argument appears not to have impressed the Chinaman, and I don't suppose it will impress anybody else who reasons. A physician is frequently called upon to clean a patient's stomach, and friends of the dentist may well say that sort of work has far more objectionable features than the cleaning of teeth."

This is undoubtedly an extreme case, but there is enough significance in the incident and enough truth in the criticisms to furnish the dental profession food for serious thought. It is all very well to talk of dentistry being a learned profession, but we will never make it such nor raise it to the position it should occupy in the minds of the community so long as we continue in this self-satisfied state and blind our eyes to the true condition of affairs. Even the most ardent champions of dentistry must admit that its members do not rank with those of other professions, nor even with the average men in other walks of life. We do not believe the low estimate which the public puts upon dentists is due to the nature of their work, but rather to their lack of education and culture. Forty years ago Dr. L. D. Shepard said, "Seriously, as a profession, do we read enough? Are we up to the times as a learned profession in the great throes of thought, science and progress? One grand curse upon our profession from its beginning to the present day has been the lamentable and very general ignorance of its members." Could not the same be said to-day with quite as much truth, and what is the remedy?

Notices.

SEDALIA DENTAL SOCIETY.

The Sedalia, Mo., Dental Society held its semi-annual meeting June 19, 1904, and elected the following officers: President, F. M. Fulkerson; Vice-president, E. L. Moore; Secretary and Treasurer, M. L. Myers.

SOUTHERN CALIFORNIA DENTAL ASSOCIATION.

The next annual meeting of the Southern California Dental Association will be held Oct. 24-26, 1904, at Hotel del Coronado, San Diego, Cal. This meeting should be largely attended, as many important and interesting features will be presented.

C. M. BENBROOK, Secy., Los Angeles.

NORTHERN IOWA DENTAL SOCIETY.

The Northern Iowa Dental Society held its tenth annual meeting at Waterloo, July 27-28, 1904, and elected the following officers: President, A. W. Beach, Sheldon; Vice-president, C. L. Topliff, Decorah; Secretary, C. N. Booth, Cedar Rapids; Treasurer, F. C. Blanchard, Waterloo.

CENTRAL TEXAS DENTAL ASSOCIATION.

The Central Texas Dental Association was organized Aug. 13, 1904, at Temple, and the following officers were elected: President, Pitt S. Turner, Belton; Secretary, J. M. Murphy, Temple. Another meeting will be held Sept. 24, for the purpose of completing the details and effecting a permanent organization.

MASSACHUSETTS BOARD OF REGISTRATION IN DENTISTRY.

The next meeting of the Massachusetts Board of Registration in Dentistry for the examination of candidates will be held in Boston, Oct. 26-28, 1904. All applications, together with the fee of \$20, must be filed with the secretary of the Board on or before Oct. 19, as no application for this meeting will be received after that date. Application blanks may be obtained from the Secretary.

G. E. MITCHELL, Secy., Haverhill, Mass.

MAINE DENTAL SOCIETY.

The annual meeting of the Maine Dental Society was held July 20, 1904, at Bangor, and the following officers were elected: President, R. W. Bickford, Rockland; Vice-president, F. H. Moore, Calais; Treasurer, E. J. Roberts, Augusta; Librarian, Elbridge Bacon, Bar Mills; Executive Committee, George E. Dow, Portland; L. W. Hart, Camden; W. S. Fogg, Cornish; Will S. Payson, Castine.

VIRGINIA STATE DENTAL ASSOCIATION.

The Virginia State Dental Association held its annual meeting Aug. 3-6, 1904, and elected the following officers: President, R. L. Simpson, Fin-castle; First Vice-president, J. L. Walker, Norfolk; Second Vice-president, E. W. Eggleston, Richmond; Third Vice-president, L. M. Cowardin, Rich-mond; Treasurer, W. H. Ewall, Portsmouth; Recording Secretary, George F. Keese, Richmond; Corresponding Secretary, J. Hall Moore, Richmond; Executive Committee, E. P. Beadles, Danville; A. L. Stratford, Richmond, and W. H. Mosely, South Boston.

NEW JERSEY STATE DENTAL BOARD.

The New Jersey State Board of Registration and Examination in Dentistry will hold its semi-annual meeting in the theoretical branches in the Assembly Chamber of the State House at Trenton, Oct. 18-20, 1904. Practical pros-thetic work to be done in the office of Dr. A. Irwin, 425 Cooper St., Camden, on a date assigned by him. Practical operative work to be done in the office of Dr. C. S. Stockton, 7 Central Ave., Newark, on a date assigned by the secretary. All applications must be in the hands of the secretary by Oct. 15.

CHAS. A. MEEKER, Secy., 29 Fulton St., Newark.

News Summary.

W. P. ANDERSON, a dentist of Joplin, Mo., died July 14, 1904.

M. D. NISBET, a dentist of Sioux City, Ia., died Aug. 13, 1904.

D. E. WHITBY, a dentist of Montgomery, Ala., died July 25, 1904.

A. C. HOLDER, 45 years old, a dentist of New York, died Aug. 10, 1904.

L. W. BRISTOL, 88 years old, a dentist of Lockport, N. Y., died Aug. 11, 1904.

CHARLES A. BILLS, a dentist of Natick, Mass., died July 19, 1904, of heart disease.

A. E. SWANSON, 34 years old, a dentist of Albuquerque, N. M., died July 15, 1904.

JACOB S. SIMMERMAN, 72 years old, a dentist of Millville, N. J., died July 25, 1904.

WILLIAM B. GREEN, 71 years old, a dentist of Providence, R. I., died July 22, 1904.

MORLEY E. BRADDON, a dentist of London, Ont., died Aug. 9, 1904, after a brief illness from appendicitis.

LEO H. DELANGE, 79 years old, a dentist of Asbury Park, N. J., died Aug. 10, 1904, of acute Bright's disease.

BANKRUPT.—W. E. Day, Peoria, Ill., declared bankruptcy, Aug. 2. His liabilities are \$20,510.23, and his assets \$429.20.

JOHN S. COMAN, a dentist of Harlem, Ill., was drowned Aug. 19, 1904, while attempting to save a drowning woman's life.

MUMMIFYING PASTE.—Take tannic acid and thymol, of each equal parts, with glycerol sufficient quantity to make a stiff paste.—*Brief.*

LEWIS STUART, a dentist of New York City, was stabbed Aug. 3, 1904, with a penknife by his brother, over a quarrel of long standing.

LANCE HANDLES.—Use lances with solid metal handles only. They are easily kept clean. Keep the blade sharp and clean by inserting it into a cork when not in use.—HOMER ALMON, *Review.*

PAINLESS.—At a recent painless congress one of the members said the pulp in this particular case had been thoroughly "coconosed." No pain could have attended its removal!—*D. O. & L.*

HOLDING RUBBER DAM.—When the rubber dam will not stay where you want it under the gum, use fine copper wire as a ligature and it will readily adapt itself just where you desire it to stay.—L. W. JORDAN, *Summary.*

TO PREVENT AN ENGINE CORD FROM SLIPPING.—A little beeswax and resin applied to the engine cord will prevent it from slipping. Try this the next time you are without a rubber rim.—R. M. PEARCE, Rock Island, Ill., *Review.*

EQUINOX.—"Uncle George," said the little boy, "what is an equinox?"

"An equinox," said Uncle George, who was fresh from college, "why—er—that's a sort of freak, I suppose; half horse and half ox."—*Philadelphia Press.*

LIGATURE BETWEEN TEETH.—In cases where the ligature cannot be passed between the teeth, place it in position and spread the teeth apart with a separator. Only a turn or two will be necessary.—SYLVESTER MOYER, Galt, Ont., *Review.*

SWAGE FOR CROWN CAP.—Place a ferrule on the end of a piece of pine wood of proper size and use as a counter-die. After using a few times the ferrule can be forced up on the stick and the used part cut off.—J. MILLS, Brantford, Ont., *Review.*

FIRES.—C. A. Sweeney, Independence, Ia., Aug. 12.—Gratiot Dental Parlors, Port Huron, Mich., Aug. 1.—R. W. Hawes, Monmouth, Ill., July 28.—Odöntunder Dental Parlors, Aug. 10, Dunkirk, N. Y.—M. F. & C. D. Elliott, Franklin, Pa., July 23.

POWER TO WORK AN ATOMIZER.—The ordinary rubber bulb sold with atomizers is of very little use, as sufficient pressure cannot be obtained to produce the required spray. I use a bicycle foot pump attached to the atomizer with a piece of rubber tubing.—OLIVER MARTIN, Ottawa, Ont., *Review.*

PREPARING SENSITIVE LABIAL OR BUCCAL CAVITIES.—Erosions at the gum margins can be prepared for the insertion of fillings with little pain to the patient by applying dry tannic acid instead of adding glycerin to it. This will not produce any bad after-effects.—J. NELSON PLATT, Gallup, N. M., *Review.*

SUSPENSE CAUSES DEATH.—According to newspaper report, a farmer went to a dentist's office in Conneaut, O., to pay a bill, and while waiting to learn the amount of his indebtedness he was seized with heart failure and died almost instantly. It would be interesting to know the amount of that bill.

DAMAGE SUITS.—A woman in Bellefontaine, O., has sued a dentist for \$2,000 damages, alleging that he took a set of artificial teeth from her mouth several weeks after she had purchased them from him.—A man in Bridgeport, N. Y., is suing a dentist for making him a set of teeth with which he cannot chew his food.

RASH.—A certain young man of great gumption

'Mongst cannibals had the presumption

To go—but alack,

He never came back;

They say 'twas a case of consumption.—*Yale Record*.

VERBOSE.—A young lady just returned from a year's residence in Germany reported a loose filling. "Ah," remarked the wise dentist, "you've been eating more than your share of that continental bread." "Yes, but it wasn't the bread, it was a word of seventeen syllables—the same word that Mark Twain says sent another young lady to the hospital."—*D. O. & L.*

ALUMINUM POLISH.—Procure from a hardware dealer a supply of universal metal polish (Putz Pomade) and apply the smallest amount possible to a thin cotton wheel by means of a piece of wood, upon which a small amount of polish has been placed, and held against the wheel while running the lathe. The polish should be used without water.—*J. MILLS, Brantford, Ont., Review.*

ARKANSAS STONES.—Wash your Arkansas stone with soap and water and never again use oil upon it. While operating keep it on the bracket table and sharpen all cutting instruments with water only before using. Water is more cleanly, efficient and presentable than oil. It oxidizes the particles of iron and the oxid aids in producing a keen edge.—*W. C. GOWAN, Creemore, Ont., Review.*

EXAMINING BOARD AFFAIRS.—The Connecticut Dental Commission, at its July meeting, granted licenses to 29 applicants.—Forty-eight students passed the examinations at the New Jersey Board, meeting in July.—The State Board of Nebraska met Aug. 13 and elected the following officers: President, Louis N. Wenthe, Lincoln; Vice-president, W. N. Dorward, Omaha; Secretary, V. A. Meese, Auburn.

ROBBERIES.—The following dentists of Waco, Tex., were robbed, July 28: Drs. Forman, Chambers, Hall and Gibson; loss, several hundred dollars.—July 30, Frank E. Light, Waltham, Mass., \$40 worth of gold filling.—Aug. 3, W. A. Enyon, Easton, Pa., \$30.—Aug. 12, J. D. Throckmorton, Red Bank, N. J., \$60.—A. E. Kellogg, Cresco, Iowa, Aug. 7, \$65.—July 24, Drs. Watts and Wall of Springfield, Ill., \$100.—G. Sibley & Co., Philadelphia, have accused a dental salesman of stealing dental materials amounting to \$560.

ILLEGAL PRACTITIONERS.—July 21, a man was arrested at San Francisco for practicing dentistry without a license.—July 30 an employe in a dental parlor in Denver was arrested for practicing dentistry without a license.—Aug. 18 two complaints were sworn out against men for practicing dentistry without a license in Cripple Creek, Colo.—Aug. 8 a dentist in New York was fined \$50 for practicing dentistry without a license.

NAUSEA PRODUCED BY THE INSERTION OF IMPRESSION MATERIAL.—It occasionally happens that considerable nausea is caused by the impression material on the soft palate. This tendency can be overcome by gargling with camphor water, or the use of a little cocain in solution on the palate, also by manipulating the palate with the end of the finger or a feather previous to taking the impression; a few doses of sodium bromid are also efficacious.—J. F. WESSELS, *Brief*.

MERCURIC CYANID NOT A SUITABLE ANTISEPTIC.—Harrington has conducted laboratory experiments to test the value of mercuric cyanid as a surgical disinfectant. A 1:1,000 solution of the pure salt was found incapable of destroying the staphylococcus pyogenes aureus in three hours' time. The author has tested the salt on other germs, and concludes that it is not a suitable preparation for use as a practical surgical antiseptic.—*N. Y. Med. Jour.*

REPAIRING AMALGAM FILLINGS.—By Stanley Read, L.D.S. Eng. (*Brit. Dent. Jour.*) If it is desirable to add to an old amalgam filling, clean the surface to be added to with a bur, cross-cut in preference, wipe the cleaned part of the amalgam with a piece of cotton-wool moistened with concentrated phosphoric acid, and pack on the new amalgam, which will adhere with no trouble. Such a joint has about 80 per cent of the strength of the amalgams used.

PROPORTION OF WATER AND PLASTER FOR AN IMPRESSION.—An ordinary mix of plaster of Paris suitable for a good-sized impression requires about 40 cc. of water and 55 gm. of plaster. To the water, before the mix is made, should be added 5 gm. of potassium sulfate, to be thoroughly dissolved. The plaster is then slowly sifted into the water and the spatula carried slowly through the mass and around the sides of the bowl with a sweeping motion, just enough to insure a uniform mix. Then place quickly in the tray, and if too soft for introduction into the mouth, wait until it has set sufficiently to meet the requirements and then proceed.—J. H. PROTHERO.

MARRIAGES.—Lee W. Atkinson, a dentist of Salem, O., was married to Miss Mabel L. Pettit of Garfield, O., Aug. 17.—Ray English, a dentist of Clay City, Ind., was married to Miss Nell Slinkard of Tanner, Ind., July 31.—Charles Monks, a dentist of New Britain, Conn., was married to Miss Myrtle H. Smith of Wellsboro, Pa., July 9.—Harry K. Pratt, a dentist of Appleton, Wis., was married to Miss Elsie Sebald of Plymouth, Wis., Aug. 10.—James Saddler, a dentist of Lagrange, Ky., was married to Miss Charlotte Starke of Trimble County, Ky., Aug. 15.—John B. Vedder, a dentist of Akron, O., was married to Miss Katherine Allyne Thompson of Akron, July 26.

IMPROVED TINCTURE OF IODIN.—According to Claret, an improved tincture of iodine may be made by dissolving 1 gram iodine crystals and 2 grams borax in twelve grams of 90 per cent alcohol. According to the author, the addition of the borax prevents the formation of hydriodic acid, which otherwise takes place in the solution and which is the cause of considerable irritation and pain when the tincture, as ordinarily made, is applied to the skin.—*Pacific Med. Jour.*

MAKING SURFACE OF WAX SMOOTH.—A smooth surface on a "waxed-up case" can be obtained without spoiling festoons or gum carvings by adopting the following method: Smear the surface of the wax with a pellet of cotton saturated in chloroform. Burn off the chloroform with an alcohol lamp or a small bunsen flame. This will leave a smooth, glossy surface on the wax and will not destroy previously-carved gums.—H. H. HANCOCK, Merriam Park, Minn., *Review*.

REMOVING DIFFICULT ROOTS.—Short roots which are nearly covered with gum tissue may be removed with very little pain and no laceration of either gums or process by inserting a wood screw into the canal. The screw should be about half an inch long and one-sixteenth of an inch in diameter. The projecting end can be grasped with the forceps. The use of a small tap corresponding in size with the screw facilitates its insertion.—MARK G. McELHINNEY, Ottawa, Canada, *Review*.

TREATMENT OF BURNS.—Capurbano uses a solution of tannin in glycerin for the local treatment of burns and scalds. The solution is used in the strength of fifty per cent, and the glycerin must be pure. The bullæ are punctured, and gauze soaked in the glycerio-tannate is applied. The solution is again applied several times daily without removing the gauze, until the new epidermis is formed and the gauze falls off. In burns of the third degree the destroyed tissues are removed, so far as the part will permit, and the application is made in the same way. In this mixture the glycerin, as well as the tannin, is important, as the tannin alone cannot heal a burn.—*New York Med. Jour.*

ACCIDENTS.—As the result of having a tooth extracted a man in San Francisco, Cal., is in a dangerous condition from loss of blood.—A man in La Crosse, Wis., has been seriously ill for three days as a result of having swallowed a set of teeth. It was not known until the third day what the cause of his illness was, as he could not speak.—A man in Belvidere, Ill., took ether before having some teeth extracted, and almost died from the effects of it.—This month a woman in Iowa almost died from hemorrhage after having some teeth extracted.—Last month a man in Logansport, Ind., almost died while under the influence of an anesthetic, given for tooth extraction.—A vulcanizer exploded in Dr. F. C. Ayer's office in Syracuse, N. Y., July 26, and completely wrecked his office, causing a loss of \$300.—An iron retort, used in making vitalized air, blew up in the laboratory of the Albany dentists, York, Pa., but did little damage.—A vulcanizer in the dental offices of Dr. B. W. Day, Los Angeles, Cal., exploded Aug. 6, wrecking his office.

SEPARATING.—When inserting a mechanical separator and the separating points go higher than they should, crowding uncomfortably on the soft tissues, the screws should be relaxed, the points held in the right position, while pieces of gutta-percha are warmed and crowded under the bows. When these are hard (and the hardening may be hastened with the chip-blower) the upward movement of the points is prevented, and separation is proceeded with as usual.—GARRETT NEWKIRK, *Dominion*.

IMPRESSIONS OF THE LOWER JAW.—When taking an impression of the lower jaw in either wax or modeling compound, it is necessary that the cheek on either side be pulled out by inserting the finger along the buccal side of the impression tray so as to lift out the fold of the muscles that may have been caught under the edge of the tray and material. The patient should also be instructed to raise the tongue from the floor of the mouth and extend it, so as to prevent the impression from impinging upon the muscles beneath the tongue.—J. F. WESSELS, *Brief*.

DOES NOT OWN TEETH BECAUSE HE USES THEM.—Artificial teeth must be paid for in full before the individual using them can claim ownership. This is the substance of a decision that has recently been rendered by a judge in Wisconsin. A man sued his dentist for the recovery of a plate, which the dentist refused to return after it had been given to him for repair, claiming that it had not been fully paid for. The judge decided in favor of the dentist, holding that the fitting of teeth in the mouth of a patient does not constitute delivery until the full amount has been paid.

HAD NO MIDDLE EAR.—In his early practice Dr. D. B. St. John Roosa, the eminent New York specialist, one day received a letter from a man living in a remote part of Connecticut, says the *Saturday Evening Post*. The writer explained that he was afflicted with growing deafness, and that a summer visitor had suggested his consulting Dr. Roosa. After describing the symptoms the man ended by asking what was the probable nature of his trouble. Dr. Roosa advised the man to consult a local physician, and added: "From what you say I should presume that your difficulty arises from a diseased condition of the middle ear."

Two days later the doctor found this among his mail: "Dear Sir:—Yours received and contents noted. What do you take me for—a ring-streaked willipus-wallipus? You talk about my middle ear; how many ears do you think I've got—three or five? My ears may be pretty long, and I guess they are, or I wouldn't be writing to no New York doctor for advice, but I'd have you to understand that I've got just two of them, and no more, like other folks, so there ain't no middle one. Don't get fresh."

ETIOLOGY OF THE HYPERPLASIA OF THE PHARYNGEAL TONSIL.—From a consideration of the most recent views advanced, the following conclusions as to the origin of this condition are proposed by T. J. Harris (*Amer. Med.*): The first claim is that the pharyngeal tonsil possesses a distinct function. This function is of the nature of a defense against the entrance of bacteria and consists in a certain irrigation of the tonsil surface by a lymph stream loaded with lymphocytes. This protective function is in harmony with the

inherent tendency of the tonsil to enlarge on the slightest irritation for the affording of further powers of defense. This inherent tendency is further seen in the frequent recurrence of the tonsil after removal. Strictly speaking, it is claimed that such enlargements are not a pathological but a physiological process.—*Medical News.*

RESTORATION OF CONTOUR WITH BRIDGES.—When from loss of one or more of the anterior teeth in the upper jaw there is considerable absorption, the bridge should have porcelain gum or pink rubber to restore the contour and sustain the lip. The old plate gum teeth can be used to great advantage. When a bicuspid and molar are lost, with the usual absorption, and the adjoining molars and bicuspids are sound, I have found that a rubber bridge with properly made and adapted clasps answers every demand, obviating the grinding down of the teeth.—W. H. SHULZE, *Western.*

A MODEL LETTER FROM PATIENT TO DENTIST.—

May tha 12 1904

Der sur Yor Bill Reseved But sore that i have had such luck that I cudint sav eney money up to eney thing I have bin sick mi self & fater has lad 3 tumers taken out of him & hit has tuck all that I cud Ras so I will Pay you jest as qick as i can

Yore frend

Miss L—— T———. —Hints.

MIXED ANESTHESIA.—Robertson reports the results he has obtained by giving one one-hundredth of a grain of hyoscin hydrobromid half an hour before the beginning of ether inhalations. He has tried the method so far fifty-seven times, and believes it to be of great value. Whether the injections of hyoscin hydrobromid are without danger time alone will show. Among the advantages claimed for the innovation suggested the following may be enumerated: The period of excitement is shortened and the excitement itself is reduced in intensity; complete anesthesia can be obtained in a shorter time (the average time required by the author in fifty-seven cases was five and one-half minutes); the quantity of mucus produced by the ether irritation is greatly reduced; vomiting after anesthesia is less frequent and less severe.—*N. Y. Med. Jour.*

NO APPEAL FROM A FATAL DOSE.—A lady was passing through the wards of an overcrowded military hospital when she suddenly encountered two men sawing and hammering on some boards. She looked at them in some surprise and wonderingly asked: "What are you doing there, my men?" They looked up at her and one of them said: "What are we doing? Why, we're making a coffin, that's what we're doing."

"A coffin?" she asked. "For whom are you making a coffin?"

"For that fellow over there in that bed. Don't you see him?"

The lady looked in the direction indicated and saw a man apparently in good condition and watching the operation with great interest.

"Why, that man is not dead, and, indeed, he does not look as if he were going to die. Can't you postpone this work?"

"No," the men said, "we can't postpone it. The doctor told us to make the coffin, and he knows what he gave him."

MAGNESIUM HYDRATE TO FACILITATE REMOVAL OF PLASTER FROM MOUTH.—It is in taking the impressions for partial dentures that the most difficulty is usually experienced. If the remaining teeth are short and straight, and no wedge-shaped spaces or undercuts are formed between them, little difficulty will be experienced. When the teeth are long, or when they incline toward each other and form dovetail spaces, or when several teeth are loose, then the condition is more complicated and must be dealt with accordingly. A good expedient in all cases of impression-taking for partial cases is to have the patient rinse the mouth with milk of magnesia just before taking the impression. A thin coating of magnesia is left on the teeth, which seems to allow the plaster to be removed more readily.—J. F. WESSELS, *Brief*.

MASSAGING IN PYORRHEA.—Massaging the gums often increases the capillary circulation, the lack of which is one of the principal causes of this disease. We often meet the disease advanced to the stage where the teeth have become loosened. I have found ligation, in the not too far advanced stage, satisfactory in lessening the danger of increasing the surrounding inflammation, but when the gums have loosened to such an extent as to entirely fail to support the teeth I use a number of bands, either of gold or of other suitable metal, made to tightly fit the necks of the teeth well up toward the biting edge. After placing these bands in position I take an impression, removing bands in same, soldering bands together in relative positions and then replacing, with the use of cement if found necessary; then proceed with treatment.—F. R. MAYER, *International*.

SCIENTIFIC ATTITUDE IN EVERYDAY LIFE.—Prof. Francis E. Lloyd described the method of thought used by the scientist, and showed that this method is used by all of us in everyday life; that it is the method which we use as children. When used by the scientist it comes under careful scrutiny and control. We therefore see the meaning of Huxley's statement that the method of the scientist is refined common sense. All studies may be prosecuted by this method, since it is common to all. Any advantages which one study may offer beyond another must be due to its subject-matter. The strict application of the scientific method makes for ideals in life and character, since it enforces upon the mind standards of honesty which are of the highest, and are impersonal. Those who have had the advantage of scientific training should see clearly that they are under the obligation to carry the ideals thus gained into their everyday life.—*Amer. Jour. of Pharmacy*.

THERAPEUTIC PROPERTIES OF RADIUM.—Although the early reports on the therapeutic properties of radium have been for the most part thus far very favorable, it is well to temper our credence with a certain amount of skepticism, until the early and somewhat meager reports are amply confirmed by a more prolonged and patient investigation. While it is highly probable, from its close analogy to X-rays, that it will be demonstrated to possess positive therapeutic properties, and may be destined to hold an important place in cutaneous medicine, we must not lose sight of the fact that in its present form its physical properties are decidedly weaker than those of the X-ray; that it is a new and relatively untried remedy, and like all new and

untried agents—we need only refer to the introduction into our therapeutics of electricity, liquid air and the X-ray by way of comparison—our expectations are usually enthusiastically great, while our realizations are often relatively small.—M. L. H., *Cincinnati Lancet-Clinic*.

CARBONIZED COTTON AS A CARRIER FOR ARSENIC.—As a carrier for arsenic in devitalizing pulps this is very useful on account of the ease with which the paste can be applied precisely on the spot required, and the absence of any pressure or irritation resulting from it. In using it for this purpose my method is to saturate a small portion of the carbonized cotton with any suitable antiseptic, such as carbolic acid and oil of cloves equal parts, remove the excess of fluid with spunk or bibulous paper, so as to have the cotton just moist. I then take up a small quantity of the paste on a spatula, place on the carbonized cotton as I hold it between the points of my dressing pliers, and then carefully carry it to place. The carbonized cotton being so very light and moist is almost drawn to place by capillary attraction, so to speak. Another piece of moist carbonized cotton larger than the first is then placed over the first piece, and the cavity hermetically sealed. I have never had any pain resulting on account of undue pressure upon an exposed pulp when applied in this way, and sealing with formalin cement mixed rather thin.—A. JESSEL, *Review*.

REPAIRING FRACTURED PLASTER CASTS.—A valuable method of repairing fractured plaster casts may be found in the use of celluloid dissolved in camphor and ether to a creamy consistence. A good quality of celluloid should be selected, and to it should be added a mixture of equal parts of ether and spirits of camphor. This combination dissolves celluloid rapidly, and should be added to the material until a solution of a creamy consistence is obtained. The preparation should be kept tightly corked to avoid its evaporation. When it becomes desirable to repair broken casts, the fragments to be attached should be well dried and both surfaces should be freed from broken particles. The surfaces should be coated with the celluloid solution, and after being pressed firmly, should be allowed to dry. This method the writer has found to possess many advantages over the common practice of attaching the fragments by means of resinous products. The line of union is impervious to moisture, and plaster casts thus repaired have been found to resist the stress of flasking, boiling, packing and pressing in the process of vulcanizing.—S. MERRILL WEEKS, *Cosmos*.

SODIUM DIOXID IN THE TREATMENT OF ROOT-CANALS.—In treating teeth having putrescent pulps, I find that the 50 per cent solution of Na_2O_2 is the best preparation to get the canals thoroughly clean. The Na_2O_2 forms soap with the fatty constituents of pulp-matter, and is easily removed by repeated syringing with warm water. Anyone who has not used the Na_2O_2 would be astonished at the effect produced by its thorough application. In cases of abscess I follow the above treatment, and inject a few drops of aromatic sulfuric acid through the canal into the abscess sac; then dry the canals, dress them with wood creosote, and cover with temporary stopping for three days. At the next visit apply rubber dam, remove dressings, wash the cavity

out with H_2O_2 , 5 per cent; then use alcohol; dry, and dress again with wood creosote for a week. By that time the tooth is generally ready for filling. I could quote case after case so treated, and in eighteen months I have had no report of after-trouble. It is really when we come to the question of bicuspid and molar canals that we are forced to realize that some other method than attempting to clean out the canals and fill the same is necessary in the vast majority of cases.—C. A. FIRTHE, *Cosmos*.

VULCANIZATION AT LOW TEMPERATURE: ITS ADVANTAGES.—I think that the liability to disintegration or discoloration in pink, black, or red rubber may be somewhat obviated, and that any kind will make a more perfect plate, if vulcanized for a long time at a low temperature, and I have found that pink rubber when treated in that way gives greater strength, durability, and impenetrability. The practice of vulcanizing pink rubber or other rubber for the usual time of one hour at a temperature of 320° is not a proper one; no less time than an hour and a half at from 308° to 310° , or far better still, three hours at 290° , will give a much more satisfactory result. There is not a pink rubber upon the market but is increased in strength and durability, just as the red rubber is, by vulcanizing a long time at a lower temperature. Pink rubber will absolutely not change one iota in color in ten, fifteen, or twenty years, if vulcanized three hours at a temperature of 280° , running it up to 290° at the end of the third hour. I say that because I have proved it in my experience. It will not disintegrate and will not be penetrated by fluids of the mouth. So that you, who are wedded to the pink gums, if you treat your rubber in that way, will find that the color will be maintained, and the impenetrability will be just as good as that of the red rubber that you vulcanize now at 320° for one hour.—J. D. PATTERSON, *Western*.

ADRENALIN IN LOCAL ANESTHESIA.—Braun (*Centralblatt für Chirurgie*) states that the two most important points to be considered in the use of adrenalin for this purpose are the dose and the danger of secondary hemorrhage. As regards the dose, such a powerful drug as it is should be used only with great care. A dose of 1 milligram is entirely too large to be subcutaneously injected. In one case an injection of 20 cc. of a 0.5 per cent solution of eucain B with 10 drops of the 1:1,000 adrenalin solution caused vomiting and prostration which lasted for an hour; in several other cases this dose caused some cardiac palpitation. Hartwig and others have had some very unfavorable symptoms from this dose, and Enderlen has reported a case where the injection of 8 cc. of cocaine, with 8 drops of adrenalin solution, was followed by a fatal result. The best solution would seem to be one composed of hydrochloric acid 0.2, sodium chlorid 0.8, and distilled water 100 parts. Then 10 cc. of this mixture should be placed in a test tube and heated to the boiling point, and 1 cc. of adrenalin added, when the solution is to be again boiled. This will give a colorless solution in which the greater part of the salt is neutralized by the adrenalin. Two drops of carbolic acid should be added and then the fluid should be kept in bottles holding from 3 cc. to 5 cc. This solution will keep indefinitely.—*Amer. Jour. of the Med. Sciences*.

EFFECTS OF CROWNING UPON PULP-VITALITY.—My records show that ten per cent of the pulps of teeth which have been capped have died within one and a half to two years from the time that the teeth were prepared and the cap put on. The grinding of a tooth to allow of a perfect-fitting cap, between the ages of twenty and forty, or before the horns of the pulp begin to calcify, conjoined with the irritating influence of the phosphoric acid in the cement retaining the cap, results not infrequently in its death. These fatalities can be reduced, first, by protecting the exposed dentin from the phosphoric acid with a coating of Canada balsam; second, by doing less grinding even at the expense of securing a less accurately fitting cap, in so far as the cap may be a line or two short of reaching the gum margin; third, by coating the tooth, especially the exposed portion, with a strong solution of silver nitrate. Of the two evils, a dead pulp or a cap leaving exposed a line or two of the tooth, the latter I think preferable.—J. CLARENCE SALVAS, *Brief*.

ELECTROLYSIS.—When acids, salts or bases are dissolved in a liquid, usually water, the molecules of these compounds break up into ions. The resulting solution possesses the property of conducting an electric current, and is, according to Faraday, called an electrolyte. When such a current passes through the electrolytic solution the latter undergoes certain changes which are generically termed electrolysis. If, on the other hand, a liquid has not the power of dissociating molecules into ions, it cannot conduct an electric current. Now, according to Arrhenius, the conductivity of an electrolyte is proportional, depending upon (1) the number of ions, (2) the relative electric charge of these ions, and (3) the speed of the ions. Further, the resulting ions depend, with limits, on the degree of dilution of the solution; a certain definite dilution dissociates completely all molecules, and further dilution merely separates the ions farther from each other. For example, if sodium sulfate (Na_2SO_4) is dissolved in water, two positive Na ions (kations) and one negative SO_4 ion (anion) are the result. Water has, so far as known, the greatest dissociating power, with the possible exception of hydrogen dioxide. However, formic acid, methyl alcohol, ethyl alcohol, ammonia and others are known to possess this peculiarity to a greater or less degree. The organic compounds are much less dissociated than inorganic salts, and their ions are more complex and are very little understood at present.—HERMANN PRINZ, *Era*.

USEFUL ANTISEPTIC COMBINATION.—Take two fluid ounces of pure liquid carbolic acid and equal parts camphor, menthol, and thymol. Place the latter substances in a colored three-ounce bottle, pour the acid over, and shake. It immediately becomes milky; complete solution takes two or three days; more menthol, camphor, and thymol should be added till acid is saturated. Decant clear solution and it is ready for use. It should be kept in a brown or dark blue bottle with a well-fitting glass stopper. Indications: A pulpless tooth with chronic abscess. Gain access to canal, syringe out with H_2O_2 three per cent; treat with sodium dioxide, dry the canal and flood it with the antiseptic, forcing it into the abscess sac and out through the sinus, if one be present. The apex is now sealed, and

subsequent treatment is given through the sinus, one drop of the agent being placed in the sac by means of a hypodermic syringe. Sometimes one sitting, but generally two or three are necessary to bring about a cure. It is not good treatment to hurry with a chronic abscess.

This combination is useful when used in full strength for wiping out cavities previous to filling. For pulpitis it is valuable. A small pledget of cotton wool moistened with it, placed over the pulp and covered with a light dressing, inserted without pressure, will give immediate relief. Four minims in half a tumbler of warm water make a good mouth-wash, leaving behind an agreeable sensation of cleanliness. It is, however, not recommended as a mouth-wash for constant use, but mainly after extractions or operations in the mouth. It is an efficient agent for the relief of pain after the extraction of teeth with pericementitis. I regard it as next in value to hydrogen dioxid as an all-around antiseptic and germicide. It is very simple to make. The addition of five grains of saccharin to every ounce makes it more acceptable to patients as a mouth-wash.—BERNARD BENNETTE, *Record*.

WHY ROUND-FACED PLUGGERS SHOULD BE EMPLOYED.—The *spreading* properties of gold are so well known that it seems scarcely worth while to dwell upon them, yet there are many dentists who fail to take advantage of the well-known characteristic in operative procedures. A mechanic understands the value of a convex face on one end of his hammer-head when riveting a bolt or spreading a metal plate. The dentist in his laboratory knows how to take advantage of the spreading property of gold in swaging a plate around a remaining tooth, or over the heel of the process, or if he has made a crown band too small it is readily stretched by laying over the convex surface of a projection from the anvil and tapping with a flat-faced hammer, thereby spreading portions of the mass. The goldbeater depends upon the convexity of his hammer as he beats the gold leaf to spread it in the vellum clutch or molds from an inch square to the usual four-inch square size. Indeed, the malleability of gold seems to be well understood by our profession in every department of constructive work except operative procedures at the chair. If search be made through the pluggers of the supply houses but very few will be found whose impacting points are other than flat, whatever the form of the plugger end may be, and fewer still will be found in proportion to the number kept, in the individual dental equipment; yet a mass of gold melted and run into a cylindrical form and placed in a circular cavity with parallel walls, not too deep, and just large enough to take the cylinder—allowing it to slip in and out readily—can be so “riveted” or spread in the cavity with a convex-faced plugger that it will be made to fit the cavity and hermetically seal the orifice. How much better this can be done by spreading the gold piece by piece as inserted, spreading the mass laterally, causing it to hug tightly the cavity wall from the base or seat to the surface. I feel sure that practitioners generally have not understood the ease with which moisture-tight fillings can be made by taking advantage of this characteristic of gold, and that a flat-faced plugger will not spread the mass.—D. M. CATTELL, *Review*.